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1952

THE PAN-PACIFIC ENTOMOLOGIST

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The Pan-Pacific Entomologist

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BIOLOGICAL STUDIES ON THREE FORMS OF THE TWO-SPOTTED SPIDER MITE

(Acarina: Tetranychidae)

DONALD W. DAVIS

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According to McGregor (1942) the appropriate name for the two-spotted spider mite is *Tetranychus bimaculatus* Harvey, although names such as *T. telarius* (Linn.) or *T. urticae* Koch are often used by other workers. Actually, however, the two-spotted spider mite, as it is currently determined is a complex of species or strains which differ from one another in color, host range, ability to cross breed, or some small morphological characters. The present study is concerned with biological studies of three forms of spider mites, two of which were determined by E. A. McGregor as *T. bimaculatus*. The third form, taken on a potted hydrangea plant from San Francisco, was stated by A. E. Pritchard to be a member of this complex.

Little morphological evidence was noted to separate the three forms, aside from very slight differences in the aedeagus. A. E. Pritchard (personal communication) found that one form could be distinguished from the other two by the chaetotaxy of the front legs of the female. A ring of six setae occurs at the base of the front tarsus (fig. 1) and thirteen setae occur on the front tibia of the females of this form. In contrast to this, females of the other two forms each have a ring of four setae at the base of the front tarsus (fig. 2) and ten setae on the front tibia. The fore legs of the males of all forms have six proximal setae on the tarsus and thirteen tibial setae. For convenience in this paper the forms will be referred to as "six-setae,"[1] "four-setae" and hydrangea mites.

Color, while often of limited use in mite taxonomy, may be important in the case of spider mites. Ewing (1914) conducted feeding experiments and reached the conclusion that yellows, greens and brown of the "common spider mite" are variations due

[1]Since this paper was submitted for publication, the name Tetranychus multisetis McGregor has been given to the mite referred to as the "6-setate" form herein. See E. A. McGregor, 1950. Mites of the Family Tetranychidae. American Midland Naturalist, 44(2):257-420.

to nutrition, but orange and red shades are constant and will not change even after death. Ewing as well as Cagle (1949) stated that the dark areas on the mites vary in size, shape and number due to nutrients.

Adult females of the three forms of mites discussed in the present paper were red at all times and under all the experimental conditions. In no case were females observed to exhibit the pale yellowish-orange color of overwintering females of certain other spider mites, nor were shades of brown and green encountered.

In an attempt to see if color could be used for separation of the individual forms under study, a mixed colony was started. The extremes in intensity of red were later isolated and mounted, but no correlation was found between the selections and the number of setae on the tarsus.

There is a difference in the color of the males, however. The males of the hydrangea mite are a distinct red which is nearly the same color as the females. The males of the other two forms are never a true red, but are more nearly flesh colored.

Extensive measurements of length were made on all life stages of these three forms of mites, but no significant differences were found. Life history studies showed no great differences in duration of the life cycle or the number of offspring.

As far as it could be determined, there is no difference in the host range of the "four-setae" and "six-setae" forms. The hydrangea mite, however, exhibited a distinctly different host range as it is the only form capable of surviving on hydrangea leaves, and the only one not capable of feeding on the surface of banana squash fruit. All three forms could live and reproduce well on bean leaves. Strawberry and violet could support all three forms, but were unsatisfactory as experimental hosts.

In order to determine if the setal characters were simply genetic variations within a single species, a mixed colony of "4-setae" and "6-setae" mites was established, and 73 adult females were taken at random from this mixed population. These females were in all probability fertilized individuals. All 73 females gave rise to colonies, and 60 of these colonies were successfully carried to F_1 adults. Of these 60, twenty-two had "4-setae" female parents, and 38 had "6-setae." In every case there were female offspring, and all examined were of the same type as the female parent. Wherever possible six or more F_1 females from each colony were mounted

and compared with the female parent. All together some 200 F_1 females were studied. In all cases the female parents were removed and mounted prior to the emergence of the first female F^1. Some of the colonies were carried into F_2 and F_3 generations, but the females always remained of the same type as the original female parent.

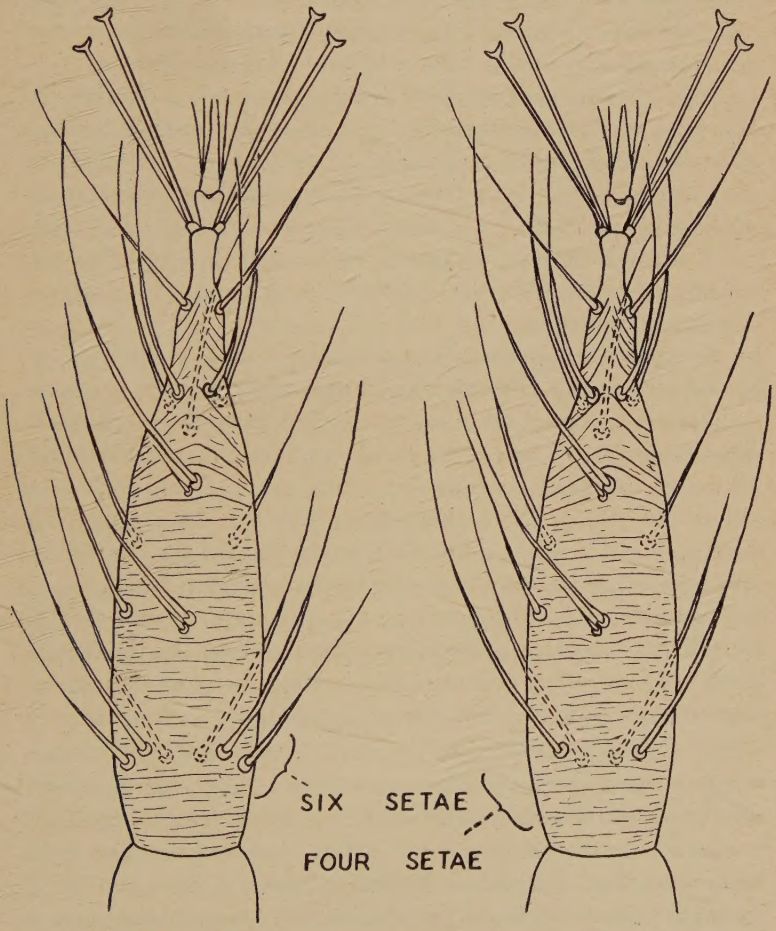

Fig. 1. Fig. 2.

Fig. 1. Dorsal view of the front tarsus of a female spider mite of the "six-setae" form. X 600.

Fig. 2. Dorsal view of the front tarsus of a female spider mite of the "four-setae" form. X 600.

A series of crosses was made to determine whether or not these three forms of mites would cross or whether they were genetically isolated. Colonies which had been started from single females, were maintained as a source of pure stock throughout the series of experiments. The hydrangea mite stock was kept on hydrangea leaves, and the other two forms were reared on banana squash. Periodically slide mounts were made and examined to be certain that the stock remained pure. In addition the female parents of each cross were mounted and examined for any possibility of contamination.

The technique used involved isolation of female deutonymphs. This guaranteed adult females to be virgins, as fertilization takes place only in the adult stage. Most of the crosses were made in single leaf cages on either bean or hydrangea leaves. The type of cage employed was developed by the Division of Biological Control, California Agricultural Experiment Station at Riverside, California, and has been used extensively both at Riverside and at their station at Albany, California.

The cage consists of a backing of waterproof ply-wood which is bordered by a strip of rubber. Inside this rubber barrier is placed a square piece of blotting paper covered with cheese cloth. A detached leaf is placed on the cheese cloth, and over this a fairly thick piece of plexiglass with a 1½ inch hole is placed to form a cell in which mites can be reared and studied. The plexiglass is held down and in place with rubber bands. The cell is covered by a thin sheet of transparent plastic fused to the plexiglass with acetone. The leaf used must be large enough to completely cover the base of the cell. The leaf is kept fresh by adding moisture to the blotter daily, or at least every second day. Bean leaves survived up to three weeks in these cages, and hydrangea leaves up to seven weeks.

To make crosses between the "four-" and "six-setae" forms, mature males and female deutonymphs were taken from the above colonies which had been established from single females. In interpreting the results of the cross-breeding experiments, it must be recognized that unfertilized females produce males only, while fertilized females produce both males and females, but with a preponderance of the latter.

Twenty-eight crosses were made between the "four-setae" and "six-setae" stocks. Sixteen of these were between "four-setae" females and "six-setae" males, and 12 were the reciprocal. Twelve of the crosses failed to produce adult offspring. Of the 16 remain-

ing crosses, 15 contained female and male offspring in a normal proportion. In every case the female offspring were of the same type as the female parent. In three of the colonies the F_1 individuals were inbred and carried through several generations. In every case the females remained the same type as the original female parent. In one cross of the original 16, there were no female offspring. Only one male was used in each cross, and it is possible that in this case the male was injured or killed so that copulation did not take place.

Further investigations were conducted in which hydrangea mites were crossed with the other two forms. A total of 18 crosses was made in which three female deutonymphs and two or three adult males were used in each cross. Four crosses were made on bean leaves, and 14 crosses were attempted using hydrangea leaves. Due to the fact that the "four-" and "six-setae" forms will not survive and reproduce on hydrangea leaves, the latter crosses all employed female hydrangea mites and males of the other forms. Several instances of copulation were observed. Of all the attempted crosses, only males were obtained, and in some cases more than 50 males were present in the F_1 population. All of the crosses employing hydrangea females gave rise to red males of the hydrangea type. The other crosses gave rise only to flesh colored males.

SUMMARY

The two-spotted spider mite[2], as currently determined, is a complex group. Three forms which were determined as belonging to this complex formed the basis of the present study. The females of all three forms were red under all experimental conditions.

A form which occurs on hydrangea was shown to be unable to cross with either of the other two forms, as evidenced by the lack of females in the F_1. The hydrangea form further differs from the others in host range, as it lives on hydrangea but is unable to survive and breed on banana squash. The males are red in this mite but not in the others.

The other two forms studied differed in the chaetotaxy of the front legs of the female. However, no differences in host range or habits were observed. On crossing these two forms, offspring of both sexes were obtained. The inheritance of the setation, however, is unique in that it was found to pass down from mother to daughter, regardless of the male used.

[2]See footnote 1.

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A LARVA OF TRICHODES ORNATUS FROM A POLLEN TRAP ON A HIVE OF HONEY BEES

WILLIAM P. NYE and GEORGE E. BOHART[1]

An apparently full-grown larva of *Trichodes ornatus* (Say) was found in December, 1950, in a tight honey tin containing stored pollen. In June of the same year this pollen was taken from a pollen trap on a hive of honey bees at North Logan, Utah. It is reasonably certain that the clerid larva was subsequently transferred from the pollen trap into the can of pollen.

Linsley and MacSwain,[2] who studied the life history of this clerid, found no records of it as an inhabitant of honey bee hives, although *Trichodes apiarius* (L.) has been recorded but not verified as a hive inhabitant in Europe. The known hosts of *T. ornatus* include a number of genera of solitary bees and also *Odynerus* and *Pseudomasaris* in the Vespidae. Linsley and MacSwain found that the larvae were able to complete their growth on *Odynerus* prepupae in five weeks but required 17 weeks to develop on pollen.

It is known that as an adult this clerid inhabits flowers (especially composites), where it feeds on pollen and living insects and oviposits on the undersides of the capitula. The first-instar larvae presumably attach themselves to visiting Hymenoptera and are carried back to the nests. The larva found in the can of pollen was probably carried to the hive in this manner and then scraped off by the pollen trap screen. It seems surprising that *Trichodes* larvae do not more frequently become established in honey bee colonies.

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[1]U.S.D.A., Agr. Res. Adm., Bureau of Entomology and Plant Quarantine in cooperation with the Utah Agricultural Experiment Station.

[2]Linsley, E. G., and J. W. MacSwain. Observations on the life history of Trichodes ornatus (Coleoptera, Cleridae), a larval predator in the nests of bees and wasps. Ann. Ent. Soc. Amer. 36(4):589-601. 1943.

THE EMERGENCE, FEEDING HABITS, AND HOST OF OPSEBIUS DILIGENS OSTEN SACKEN

(Diptera Acroceridae)

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University of California, Davis

Except for the report by Melander (1902) that the host of *Opsebius pterodontinus* Osten Sacken was *Agelenopsis naevia* (Walckenaer) (given as *Angelena naevia* Bosc.), biological information on this genus of acrocerids is wanting. Therefore the following notes may be of interest.

Immature female spiders of *Hololena curta* (McCook), were collected near Monrovia, Los Angeles County, California, on February 1, 1950. On March 20th at 10:02 p.m., while feeding this group of field-collected spiders, I noticed one individual spinning a web which resembled a protective moulting web, although the spider did not have the darkened appendages which are characteristic of the pre-moulting condition. The finished web completely surrounded the spider, which left just enough space on the inside for it to change its position. The spider then assumed this attitude: it placed its legs firmly upon the dorsal surface of the moulting web, with the ventral side of the abdomen facing upwards. It appeared nervous, making many jerking motions after which a swath of silk was added to the already heavily coated webbing.

At 10:44 p.m. the spider's abdomen dropped as if by an uncontrolled movement, and the spider then remained motionless for three minutes after which the parasitic larva emerged as follows: a very small hole appeared on the ventral surface of the spider's abdomen along the epigastric furrow, slightly to the left of the longitudinal median line. This hole then enlarged along the furrow, and the posterior part of the larva was seen to emerge. The larva remained colorless for a period of thirty seconds, at the end of which time fat bodies began to appear, and seemed to be pushed out in rhythmic motions. Large proturberances soon appeared as pseudopods bearing setae at their apices. Two rather long, dorsal, caudal spiracles appeared, disappeared and reappeared in an even respiratory count. These spiracles were visable for about twenty minutes at which time they seemed to disappear completely. The emergence of the larva seemed to be aided by the rhythmic contractions of its body, and during this period the visible portion of the larva protruding from the host noticeably increased in size.

The larva withdrew just enough to attach the posterior part of its body to the host's webbing, and then partially re-entered the host's abdomen. Four sets of setae were visible, each set divided into two rather distinct parts, and the posterior pair held the larva to the host's webbing. At 10:52 p.m. the head of the larva was partially visible through the integument of the spider, and could be seen feeding on the ventral abdominal surface. The host was apparently still alive as leg movements persisted.

At 11:03 p.m. the legs of the spider began to fold in towards its body, and since the abdomen was greatly shrunken the spider was assumed to be dead. The mouthparts of the larva were clearly seen invading the silk glands and other tissues along the ventral surface of the abdomen. The mouthparts were small (0.5 mm.), black, and heavily sclerotized. They evidently consisted of two major parts: a movable plate-like labrum, and a movable "U-shaped" mandible. While feeding on the ventral surface, the mouthparts seemed to move back and forth smoothly in an arc of about 2 mm. At 11:06 p.m. the external part of the larva measured 6 mm. in length and 3 mm. in width. The fifth set of setae was visible as the larva forced part of its body out, leaving the spider attached to the webbing by its left foreleg only.

At 11:12 p.m. the larval head was seen probing the tissues of spinnerets and this region was the site of intense feeding activity, with the larva entering and re-entering this tissue about eight times. While feeding, the mouthparts moved up and down at the rate of 2.5 movements per second. This rate continued, with little rest, throughout the entire feeding period. By 11:33 p.m., the normally brownish pigment of the spider's abdomen seemed to be almost white, with the exception of the spinnerets and the epigastrum. From 11:33 p.m. to 12:25 a.m. the larval head was seen invading tissues in the cephalothoracic region for the first time. After fifteen minutes of feeding on the nervous and other related tissues, it began ingesting the contents of the legs.

The following list of numbers refers to figure 1 and will show the sequence of feeding while in the cephalothoracic region: (2), (1), (2), (4), (8), (7), (6), (3). The feeding in the above areas was confined to coxal regions with only intermittent feeding along the margins of the sternum. Feeding in the following sequence, (3), (2), (9), (10), (4), (1), (6), (9), (7), (8), (4), (3), (2), (5), denotes complete evacuation of nearly all the tissue and total

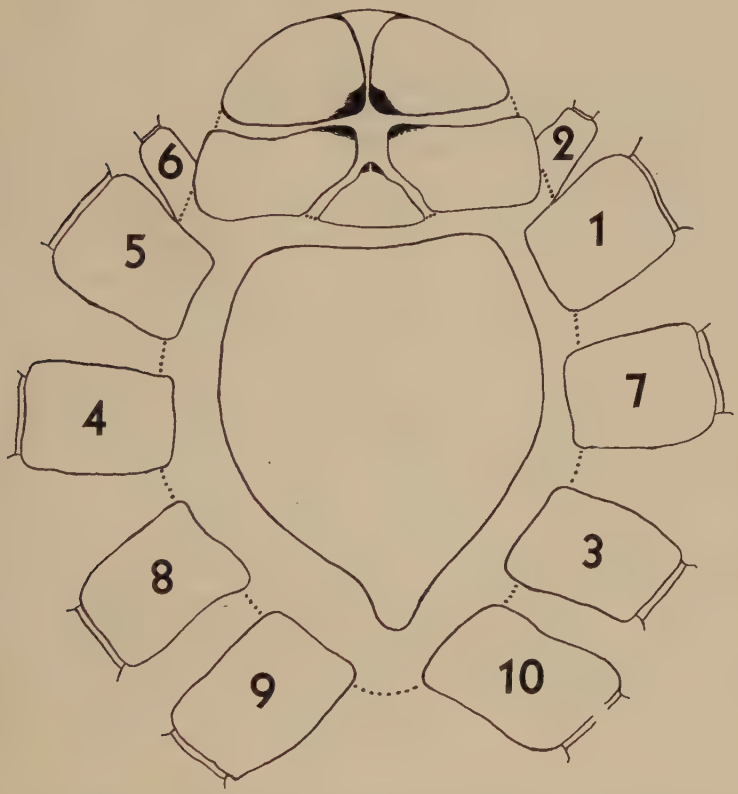

Fig. 1. Ventral sternal view (semidiagrammatic) of *Hololena curta* (McCook). Numbers refer to feeding sequence of parasite.

collapse of the trochanters, femora, and most of the tissues of the tibiae as well as the tissues of the pedipalps and chelicerae. This nearly complete collapse of the legs agrees with King (1916) who observed for *Pterodontia flavipes* Gray that, "the cephalothorax and legs were also eaten out so that the remains resembled a cast skin." This was in contrast to Kaston (1937), who observed for *Ogcodes pallidipennis* Loew[1] (given as *Ogcodes costatus* Loew) that "the cephalothorax and coxae were eaten out as well as the abdomen, but only the latter was shriveled."

The total time involved for cephalothoracic feeding apparently

[1]According to Sabrosky (1944) Ogcodes costatus Loew is a synonym of O. pallidipennis Loew.

exceeded three hours, as my observations ended at 3:36 a.m. The total time used for external feeding probably exceeded five hours.

At 8:00 a.m., March 21st, the larva was found separated from the host and was adjusting itself to the protective webbing. All five sets of setae were fastened to the protective webbing and many small droplets, which were apparently exuded from the oral orifice, were seen on the webbing where the setae were attached, and also in places not adherent to the larva. During the day, the larva was observed many times stretching out and reaching a length which was about two times its original stationary length. The larva became motionless on March 22nd, and measured 6.5 mm. in length. On March 23rd, a rather long (7 mm., black coiled meconium appeared adhering to the caudal segment. On March 24th the larva pupated, the pupa being light brown and growing darker in color, until March 29th when the adult emerged. The parasite, a male, measured 4.5 mm. in length. The imago was then placed in a large cage (15″ x 20″ x 36″) which was placed outside the laboratory under natural conditions. The specimen died April 29, 1950, thus showing an actual adult longevity of 30 days. The temperature and humidity conditions until the emergence had been fairly constant, the temperature being near 70° F., and the relative humidity near 60%. The temperatures under natural conditions varied from 45° F to 65° F with a relative humidity slightly lower than was recorded in the laboratory.

Another male *O. diligens* was reared from the same host species under the same conditions on April 21, 1950. This specimen died on May 29, 1950 (longevity 38 days).

Several other rearings of *O. diligens* from *Hololena curta* were obtained under extremely unfavorable conditions and gave the following longevity records:

1.) The host was collected near Davis, Yolo County, California, February 20, 1949. The larva emerged March 11th. The imago, a female, emerged March 24th and died April 3, 1949 (longevity 10 days).

2.) The host was collected at Davis, Yolo County, California, March 22, 1949. The larva emerged April 23rd. The imago, a female, emerged May 5th and died May 9, 1949 (longevity 4 days).

3.) The host was collected in the foothills near Monrovia, Los Angeles County, California, April 26, 1949. The larva emerged May 9th. The imago, a female, emerged May 20th and died May

29, 1949 (longevity 9 days).

4.) The host was collected in the foothills near Monrovia, Los Angeles County, California, April 26, 1949. The larva emerged May 17th. The imago, a male, emerged May 25th and died June 6, 1949 (longevity 12 days).

5.) The host was collected at Glendale, Los Angeles County, California, April 28, 1949. The larva emerged May 18th. The imago, a male, emerged May 26th and died June 11, 1949 (longevity 16 days).

The average longevity for these five specimens was 10 days. This short span was probably due to unfavorable rearing conditions.

SUMMARY

The emergence and external feeding of *Opsebius diligens* Osten Sacken on its host *Hololena curta* (McCook) is given in detail. The external feeding exhibited by this parasite is believed to be unique among parasitic Diptera. The formation of a protective web by the host spider prior to the emergence of the parasite is thought to be due to some sort of internal pressure applied by the internal larva in a specific region of the spider's body which in turn forces the production and spinning of the silk. This webbing serves as an excellent cocoon for the protection of the developing parasite. It was found that the host remained alive for nearly fifteen minutes after the emergence of the parasitic larva.

The total length of time observed for the external feeding of the larva was four hours and forty-nine minutes with five hours or more of actual feeding probably required.

The longevity of the two specimens reared under favorable conditions reached 30 and 38 days respectively. The longevity of the five specimens reared under unfavorable conditions averaged only 10 days.

The writer wishes to thank Dr. R. L. Doutt and Dr. R. M. Bohart for their helpful suggestions and criticisms of this paper, and Dr. W. J. Gertsch for determining the host spider.

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A THIRD MEXICAN SPECIES OF GENUCHINUS

(Coleoptera: Scarabaeidae)

EDWIN C. VAN DYKE
California Academy of Sciences, San Francisco

Genuchinus grandis Van Dyke, new species

Black, subopaque, feebly shining, without maculations and without conspicuous punctures above except on basal portion of scutellum. *Head* with front very minutely and sparsely, indistinctly punctured, the general surface alutaceous; clypeal margin broadly, evenly arcuate and reflexed, shining, feebly asperate laterally, and slightly elevated at middle. *Prothorax* narrowly constricted at apex, producing small right-angled front angles, sides diverging from front to middle, thence almost straight or feebly converging to the broadly rounded hind angles; base somewhat bilobed, side margin narrow in front, broader behind and continuing along the base but interrupted at middle; disc without impressions except a vague median longitudinal groove near base, practically impunctate, a few very minute, scattered punctures only observable. Scutellum large, somewhat depressed at base and coarsely punctured, acutely prolonged backwards and with a well-marked median longitudinal carina at apex. *Elytra* a third broader than prothorax and two and a fourth times as long; shoulders well rounded; sides feebly sinuate behind humeri, thence somewhat arcuate and a bit narrowed to well rounded apices; disc flat, subopaque or slightly shining with a few minute scattered punctures (only observable under high magnification) and with sides feebly wrinkled at middle third, pygidium with a few scattered shallow punctures; pro-pygidium finely and transversely rugose and with a small impression at middle of its hind margin. Undersurface: submentum large, transverse in front, rounded at sides, a bit pointed behind and with sides irregularly elevated; metasternum shallowly, umbilicately and irregularly punctured; all femora rather coarsely punctured, front tibia with a well defined tooth beyond middle of outer margin, and apex pointed and the four posterior tibiae each with a small, sharp spur at middle. Length 23 mm., breadth 9 mm.

Holotype, a unique specimen collected at LA MESA DE LA PUERCOS, 8,000 ft. alt., 12 miles west of YAHUALICA, JALISCO, MEXICO, Aug. 10, 1950, by Andrew Brown, and by him kindly presented to the California Academy of Sciences. This fine species differs from the two previously described Mexican species, *G. V-notatus* Westwood and *G. velutinus* Westwood, by being almost twice as large, of a uniform black color, more or less smooth above, without maculations and without conspicuous punctures above.

THREE NEW ERRHOMUS, WITH A KEY TO THE SPECIES

(Homoptera: Cicadellidae)

P. W. Oman

Bureau of Entomology and Plant Quarantine, Agricultural Research Administration, United States Department of Agriculture

In connection with the identification of a species of *Errhomus* from the State of Washington, I reviewed the material of this little-collected group which has accumulated since my earlier study of the genus (Proc. U. S. National Museum, 85 (3036): 169-173, 1938). This study revealed the existence of three previously unrecognized species, which are described herein, as well as the misidentification of some of the material reported upon in the earlier paper. Since the number of species has been doubled it also seems desirable to present a revised key for their differentiation.

Errhomus wolfei Oman, new species

Resembling *E. lineatus* (Baker) and *E. montanus* (Baker), but averaging slightly larger than either and the males usually heavily marked with fuscous. Dorsal process of aedeagus short and quadrate in lateral view and distal aedeagal processes not coarsely serrate. Length of male 7 mm., of female 7-8 mm.

Male sordid yellowish brown heavily marked with brown and fuscous on head and thorax, face black excepting irregular lateral areas and small pale maculae on front; forewing fuscous, veins and narrow bordering areas pale. Female pale sordid yellow with irregular pale brown to fuscous maculations. Crown of male nearly twice as long medially as next eye, that of female about two and one-half times as long medially as next eye. Male macropterous, female brachypterous. Nymps resembling female in general form and coloration.

Aedeagus stout, curved in same arc as styles, with short, keel-like, subquadrate process basally dorsad of shaft; shaft broad, rather flat, with a short terminal digitate process above gonopore and paired lateral processes as illustrated in figs. A and B; gonopore terminal.

Holotype male from WENATCHEE, WASHINGTON, May 10, 1949. Numerous *paratypes* of both sexes and nymphs from Wenatchee taken on various dates from April 15 to June 15 in 1949 and 1950. Other material is at hand from Wenatchee Heights, Monitor, Cashmere and Dryden, Washington. All specimens excepting a pair from Dryden collected by Homer R. Wolfe. The specimens from Dryden, collected by Melander, were previously reported as *lineatus*. Types and paratypes in the U. S. National Museum (No. 60897), paratypes in collection of Mr. Wolfe.

I take pleasure in naming this species for Homer R. Wolfe of the Washington State College Tree Fruit Experiment Station, who encountered it during the course of his work and to whom I am indebted for numerous specimens and interesting observations on its biology. According to Mr. Wolfe the species lives on *Balsamorrhiza sagittata* Nuttall, the nymphs first being observed during the first week of April. The first male was observed a short time later, and many cast skins could be found on both sides of the leaves. Copulation was noted during the first week of May. Mr. Wolfe reports that these leafhoppers are alert and can be seen running to the opposite sides of the leaves while the observer is still ten to fifteen feet away. When the plant is disturbed the males fly and the females and nymphs either crawl to the underside of the leaves or jump to the ground and hide in the grass.

Errhomus similis Oman, new species

Superficially identical with *E. lineatus* (Baker) but dorsal aedeagal process much shorter than shaft and distal processes with secondary spine-like projections. Close to *E. wolfei* in aedeagal characters. Length of ♂ 5.75 mm.

Color and form as in *E. lineatus* but available specimens slightly smaller than representatives of that species. Female presumably brachypterous and of the *E. lineatus* type.

Aedeagus curved in same arc as styles, with a small keel-like process basally dorsad of shaft; shaft relatively slender, with a short digitate process at apex and a pair of lateral processes as illustrated in fig. C; gonopore subterminal on caudo-ventral aspect of shaft.

Holotype male and one male paratype from YAKIMA, WASHINGTON, April 18, 1930, S. E. Crumb. One male *paratype* from Ellenburg, Wash., Oct. 17, 1929, S. E. Crumb. One male and one female specimen from Ritzville, Wash., May 19, 1922, M. C. Lane, previously identified as *E. lineatus*, are probably *E. similis*, as is a specimen in the University of Kansas collection taken near Dufur, Oregon, May 5, 1938. These specimens differ slightly from those in the type series in the number and arrangement of the secondary spine-like projections on the lateral processes, but the general structure of the aedeagus is like that of the Yakima material. Type and paratypes in the U. S. Museum (No. 60898).

Errhomus filamentus Oman, new species

Less robust than *E. wolfei*, and the aedeagus with paired basal ventral accessory processes. Length of male 8 mm.

Color sordid yellowish brown, irregularly mottled with brown and fuscous marks. Forewing suffused with pale brown, marked with fuscous along veins; veins pale, occasionally interrupted with fuscous or brown. Crown bluntly triangular anteriorly, median length about one and one-half times length next eye. Male macropterous, female presumably brachypterous.

Aedeagal shaft rather flat, broad basally, gradually narrowed to about half its basal width at apex, slightly recurved, bearing a pair of recurved, acuminate processes distally (fig. D), gonopore subterminal on dorsal side of shaft; accessory processes slightly shorter than shaft, subparallel to shaft, attenuate. Style with short dentate process on ventro-lateral surface at about middle of distal portion.

Described from a single male from Oregon Caves, Oregon, July 19, 1923, F. H. Wymore. Type in collection of California Academy of Sciences.

Key to the Species of Errhomus

A. Eyes somewhat bulbous. Very robust species, males subbrachypterous. Shaft of aedeagus broad in lateral view.....*oregonensis* (Baker)

AA. Eyes not bulbous. Relatively slender species, the males macropterous. Shaft of aedeagus slender in lateral view.

B. Lateral processes at apex of aedeagus neither serrate nor with secondary spine-like projections.

C. Aedeagus with paired ventral accessory processes arising from base .....*filamentus* Oman

CC. Aedeagus with a single dorsal accessory process arising from base. .....*lineatus* (Baker)

BB. Lateral processes at apex of aedeagus either serrate or with secondary spine-like projections.

D. Lateral aedeagal processes with secondary spine-like projections.

E. Males more than 6.5 mm. long. Gonopore terminal.....
.....*wolfei* Oman

EE. Males less than 6 mm. long. Gonopore subterminal on caudo-ventral aspect of shaft.....*similis* Oman

DD. Lateral aedeagal processes irregularly serrate on exterior margins .....*obesa* Beamer

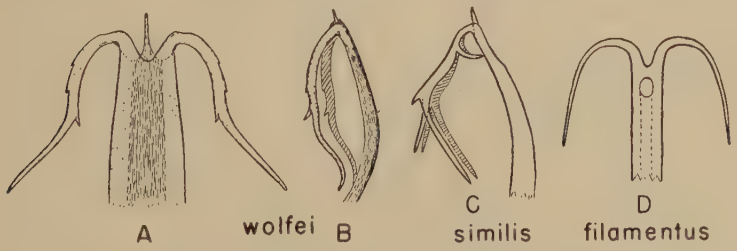

Fig. 1. A, caudo-ventral, and B, lateral view of distal part of aedeagus of *Errhomus wolfei;* C, lateral view of distal part of aedeagus of *E. similis;* D, caudo-ventral view of distal part of aedeagus of *E. filamentus.*

A NEW GALL MIDGE PEST OF TOYON BERRIES

(Diptera: Itonididae)

A. EARL PRITCHARD
University of California, Berkeley

Toyon or Christmas berry, *Photinia arbutifolia* (Ait.) Lindl., is a native California shrub that is often planted as an ornamental because of its large clusters of red berries. Gall midge larvae may feed in the berries and prevent them from developing. L. W. Swan, in connection with a study of the insects on toyon, recently reared adults of this midge. They represent a new species, and it is described in order to provide a name for use in connection with the biological studies.

Asphondylia photiniae Pritchard, new species

Photiniae resembles most other North American species of the genus *Asphondylia* by having three palpal segments. No morphological characters have been used by previous workers to distinguish these species, and each is regarded as being host specific.

Male—Eye bridge very broad. Palpus three segmented, the first very short, the second several times as long as broad, the third long, slender, and narrowing at distal end. Flagellum with 12 segments, the more distal segments slightly decreasing in size. Mesonotum dark brown with geminate, pale and setose median vittae and a pale, setose lateral margin; scutellum brown, densely setose. Wings pale brownish. Claw simple, strongly curved near distal end; empodium moderately broad, as long as claws. Abdomen moderately clothed with short curved setae. Hypopygium with tenth tergite very deeply and triangularly bilobed; tenth sternite widened from base to middle, narrowing beyond middle, and narrowly and deeply emarginate mediodistally; tegmen slender, acutely angulate distally and extending well beyond tenth segment; basiforceps with apodeme slender and parallel sided except for broad, rounded expansion near origin; distiforceps short and plump, with two strong teeth distally. Length of body 3 mm.; length of wing 3.5 mm.

Female—Similar to male, the flagellum, however, with distal segments strongly shortened, the terminal segment broader than long and with a small distal nipple. Unextended opipositor about one-half as long as abdomen. Length of body, excluding extensible portion of ovipositor 3.5 mm.; length of wing 4 mm.

Holotype: Male, Palo Alto, California, May 14, 1951 (L. W. Swan), reared from toyon fruit; in the Pritchard collection.

Paratypes: Eight males, eight females, Palo Alto, California, April 7 and May 14, 1951 (L. W. Swan), reared from toyon fruit.

NEW SPECIES AND NOTES ON CALIFORNIA MAYFLIES

(Ephemeroptera)

W. C. Day
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During the years 1948, 1949 and 1950, the writer and his wife, Helen L. Day, made numerous short expeditions, collecting Mayflies on the streams of northern California. Much of the area worked lies on the western slope of the Coast Range or above the 5,000 ft. level of the Sierra Nevada, where low temperatures after sundown make collecting at light unproductive. By collecting and rearing nymphs, however, it has been possible to make positive associations between nymph and adult. In the present paper several new species are described, and descriptions given for a few unknown nymphs or adults of known species. Also, drawings are supplied for several known species where additional detail seems desirable or necessary.

E. C. Van Dyke, E. S. Ross and Hugh B. Leech of the California Academy of Sciences have been most considerate in offering facilities and counsel based on their extensive experience. Mr. Leech has joined us on field trips and has been an unfailing source of encouragement and guidance.

Several years ago a fortunate acquaintance was made with George F. Edmunds, Jr., of the University of Utah. Mr. Edmunds has given most generously of his time and wide knowledge of the Ephemeroptera; he has supplied many comparison specimens, checked identifications and descriptions, and made generally available his understanding of this group.

Through the kindness of Henry Dietrich and W. J. Brown, numerous loans of specimens from the Cornell University collection and the Canadian National collection respectively, have been made available to me for comparison purposes. A suggestion from Robert L. Usinger of the University of California resulted in securing the fine illustrations given as part of this paper; they were drawn at the British Museum (Natural History) by Arthur Smith.

Paraleptophlebia helena Day, new species

(Plate I)

Male imago (in alcohol)

Head: Piceous with yellow brown stripe on vertex. Clypeus yellow brown. Compound eyes contiguous, upper portions pale orange and lower portions black. Ocelli milky white. Basal segments of antennae yellow brown; filaments smoky with white tips. *Thorax:* Pronotum medium black brown. Me-

sonotum deep red brown with anterior portion and postero-lateral areas black brown; wide pale band anterior to scutellum, and bordered laterally with pale yellow. Metanotum smoky, scutellum yellow. Sternum red brown with wide yellow band across prosternum. *Legs:* Coxae and trochanters of all legs pale brown with blackish markings. Foreleg uniformly yellow brown with black femorotibial joint. Middle and hind legs somewhat paler. All claws pale. *Wings:* Entirely suffused with deep red brown. Subcosta and costal brace of forewing pale yellow brown; all other veins of both wings well defined and dark brown. *Abdomen:* Tergite 1 opaque medium brown with black posterior margin. Tergites 2-7 with one-fifth to one-third in anterior portion hyaline; vague wide median hyaline stripe bordered on each side with submedian black lines; posterior halves of tergites 2-7 with large, pale, almost hyaline areas, one on each side, bordered with black brown; postero-lateral areas surfaced with black. Segments 8-10 opaque orange yellow. All tergites with black posterior margins. Sternites 2-7 semi-hyaline and pale red brown with anterior margins hyaline; a pair of short, oblique hyaline dashes on each sternite. Pleural fold broadly hyaline with wide, dark geminate line above. Black dot on spiracles of segments 2-7. Small black U-shaped mark on each tergite just above geminate line, opening forward. *Genitalia:* Forceps opaque yellow in basal third of long segment; remainder smoky. A large lobe at base of first segment of forceps. *Tails:* Dark brown, narrowly black at each joining. *Size:* Body 9 mm. long; forewing 9.5 mm.; tails 13.5 mm.; foreleg 11 mm.

Female imago (in alcohol)

Head: Yellowish-white with extensive black markings; black dashes from anterior end of median carina to each lateral ocellus; wide black W-shaped mark based on median ocellus and encompassing lateral ocelli; frontal margin dark brown. Ocelli white. Compound eyes black and widely separated. *Thorax:* Mesonotum yellow brown with pale areas anterior to and laterad of scutellum; antero-lateral margins narrowly white. Metanotum yellowish-white with blackish posterior margins. *Legs:* As in male imago, slightly paler. Coxae and trochanters marked with black. *Wings:* As in male imago. *Abdomen:* All segments opaque; ground color pale yellow, widely marked with thin black surfacings. Tergites 2-7 with narrow anterior and wide posterior pale margins except for blackish areas in postero-lateral corners. Also, at each postero-lateral margin, a strong black line crosses pleural fold, extending one-third the distance up toward median line of tergite, and one-quarter the distance down toward median line of sternite; joined to this line is another, extending at right angles along the pleural fold about one-third the distance toward anterior margin. Narrow median pale stripe on tergites bordered on each side by wider dark line. Tergite 10 largely dark. Sternites somewhat paler than ground color of tergites, with central portion of posterior margins pale. Ganglionic areas of sternites pale; sternites 1-7 each with a pair of short, pale submedian dashes near anterior margin. Posterior margin of sternite 7 thickened and immediately beyond the opening of the egg valve is a large, circular brown median spot on sternite 8. Pleural fold as in male. Spiracles marked with a black L-shaped mark. Emargination of subanal plate shallow. *Tails:* Dark brown, narrowly darker at joinings. *Size:* Body and forewing of ♀ imago 0.5 mm. longer than ♂ imago.

Nymph (in alcohol)

Head: Vertex whitish from straight posterior margin of head to lateral ocelli; a wide black V-shaped mark from the black compound eyes to median ocellus; in front of median ocellus a wide white quadrangle, bordered on anterior and lateral edges by a narrow black line. Frontal and lateral margins of head semi-transparent red brown. Antennae 3 mm. long; the two basal segments dark brown, with filaments smoky. A pair of smooth, ivory colored, pointed and incurved mandibular tusks extend forward from head 1.2 mm. *Thorax:* Pronotum yellowish-white, broadly marked with red brown in anterior and lateral portions. In the mature nymph the scutum of the contained subimago is clearly seen as a black bordered dark brown area with wide white median stripe widened into white circular areas at each end. Sclerites of sternum red brown, sutures white. *Legs:* All femora and tibiae yellow white. Femora with large brown spot on frontal edge one-quarter distant from apical end. Tibiae with wide dark brown subapical bands; femorotibial joints dark brown. All tarsi brown, darker in the basal half. Claws of foreleg with 22 to 26 denticles. *Abdomen:* Dorsum with pale yellow pattern showing through thin surfacing of black as shown in Plate I, fig. 4. Sternites light yellow with narrow black anterior margins. Lateral extensions of all segments margined with black. *Gills:* Bifid narrowly lanceolate, largest on segments 2-6, smaller on 7, and quite small on 1. Gills divided very close to base; tracheae without branchlets. *Tails:* Pale, with whorls of minute spines and longer hairs at each joining. *Size:* Body 9.5 mm. long; tails 8 mm.

Holotype: Male imago; collected by Helen L. Day on Mill Creek, Venado Road, Sonoma County, California, in October, 1949; in collection of the California Academy of Sciences. *Allotype:* Female imago; same data; in collection of California Academy of Sciences. *Paratypes:* 2 ♂ imagoes, 2 ♀ imagoes, 2 nymphs in collection of California Academy of Sciences; 1 ♂ imago, 1 ♀ imago, 1 nymph in collection of G. F. Edmunds, Jr., 21 ♂ imagoes, 5 ♀ imagoes, and 35 nymphs in author's collection.

The male adult of *P. helena* is distinguished from other *Paraleptophlebia* spp. having nymphs with tusked mandibles, by the deep brown wings. From *P. zayante* (see below), *P. helena* can be separated also by the slimmer abdomen and legs and greater delicacy of the parts of the latter. The nymph of *P. helena* has longer and straighter mandibular tusks than those of *P. zayante*. The emargination of the subanal plate of the female adult of *P. helena* is shallow and semi-circular, while that of *P. zayante* is more deep and narrow.

The nymph was found only on well-aged leaves in quiet, shoal portions of a rapid, small spring-fed stream having a temperature of 48-50° F. Mating flight of the adults begins about one hour before sunset. Association of nymph and adult was established through rearing.

Paraleptophlebia zayante Day, new species

(Plate II)

Male imago (in alcohol)

Head: Black brown with frontal shelf hyaline; median carina, basal sclerite of antennae and dot on vertex, pale yellow. Ocelli white. Compound eyes contiguous; upper portion pale orange and lower portion black. *Thorax:* Pronotum dark red brown with black markings at postero-lateral corners. Mesonotum medium brown with narrow black lateral margins; median and submedian sutures and large postero-lateral areas, pale yellow; scutellum dark brown, anterior to this, a large pale area. Metanotal scutellum pale with narrow dark brown posterior margin. Sternum pale yellow brown. *Legs:* Uniformly light red brown with tarsi darker. Femoro-tibial joint black. *Wings:* Faintly milky white very lightly tinted with palest brown in stigmatic area of forewing. Long veins of forewing and hindwing pale yellow brown, becoming lighter toward rear margins. Crossveins of forewing very fine and pale brown, becoming lighter toward rear margin. Crossveins of hindwing light brown from costa to R_1, others colorless. *Abdomen:* Segments 1, 8 and 9, and posterior half of 7 opaque. Tergites 2-6 hyaline yellow patterned with a thin surfacing of black; anterior margins are clear hyaline and posterior margins hyaline yellow; narrow hyaline median stripe bordered by wide submedian black lines; laterad of these black lines are wide hyaline lines; laterad of these hyaline lines are large dark areas with a pale area in the center of each. Pleural fold marked for its entire length by a broad, faint dark line. Each spiracle marked with a black dot. The postero-lateral corner with a short, dark line extending upward, and another as short extending forward. Sternites 2-7 hyaline yellow, each with a well-defined central dark brown ganglionic area; a pair of dark dots on each sternite. *Genitalia:* Forceps deep golden brown at base, paling distally; large lobe at base of first segment. Reflex spurs present on penes. *Tails:* Bright red brown entire length, narrowly pale at each joining. *Size:* Body 10 mm. long; forewing 10 mm; tails 12.5 mm.; foreleg 10 mm.

Female imago (in alcohol)

Head: As in male except compound eyes are small and widely separated. A wide chalky white band across the occipital region from eye to eye. *Thorax:* Notum and sternum as in male, slightly darker. *Legs:* As in male, slightly darker. *Wings:* Clear hyaline. Stigmatic area of forewing brown tinted. All veins of both wings as in male, slightly coarser and darker. *Abdomen:* Segments 1-7 pale red brown, translucent; 8-10 opaque. Tergites heavily surfaced with black wash; maculation same as male. Sternites as in male except that ganglionic areas are outlined only in dark brown. *Tails:* As in male imago, darker. *Size:* Body 10 mm. long; forewing 11.4 mm.; tails 12.5 mm.; foreleg 6 mm.

Nymph (in alcohol)

Head: Heavily washed with blackish-brown, a pale area below median ocelli; entire vertex pale. The two basal segments of antennae pale smoky; filaments yellow. A pair of smooth, yellowish, strongly incurved tusks of the mandible extend forward beyond the head. *Thorax:* Notum yellowish, mottled with black. Sternum yellowish, each of the three segments strongly marked

with large black ganglionic area. *Legs:* All segments yellowish-white, each widely banded with brown; femoro-tibial joints dark brown. 18-22 denticles on fore claw. *Abdomen:* Tergites show pale yellow pattern through surfacing of black, as shown in Plate II, fig. 5. Sternites pale, widely washed with black close to lateral margins, each with black ganglionic area. *Gills:* Bifid, lanceolate and divided to base; tracheae black, short and scattered. *Tails:* Pale, joinings narrowly black. *Size:* Body 10 mm. long; tails 9 mm.

Holotype: Male imago; collected by the author on ZAYANTE CREEK, SANTA CRUZ COUNTY, CALIFORNIA during October, 1950; in the collection of the California Academy of Sciences. *Allotype:* Female imago; same data; in collection of California Academy of Sciences. *Paratypes:* All topotypical: 2 ♂ imagoes and 2 ♀ imagoes in collection of California Academy of Sciences; 1 ♂ imago, 1 ♀ imago, 1 nymph in collection of G. F. Edmunds, Jr.; 7 ♂ imagoes, 5 ♀ imagoes and 15 nymphs in author's collection; all collected in October, 1950.

The male adult of this new species is distinguished from the closely related *P. helena* by the pale wings, as well as the genitalia; the prominent dark ganglionic marks of the sternum are completely lacking in *P. helena.* The mandibular tusks of the mature nymph of *P. zayante* compared to those of *P. helena* are one-third shorter, and are heavier and more curved. Nymphs were found in quieter water of running stream, on leaves and branches. Nymphs were intermingled with those of *P. debilis* Walker only, the latter being much more numerous. Association of nymph and adult was established through rearing.

Paraleptophlebia quisquilia Day, new species

(Plate IV, figures 6, 7)

Male imago (in alcohol)

Head: Pitchy dark brown with yellow median carina. Clypeus yellow hyaline with anterior edge black brown. Vertex with wide full-length median brown stripe. *Thorax:* Pronotum smoky marked with brown; anterior margin black. Mesonotum reddish black brown with black sutures and margins; somewhat paler before the scutellum. *Legs:* All coxae dark red brown with black pencilings. Fore femur and tibia pale red brown. Femora and tibiae of legs 2 and 3, palest yellow. All tarsi white. *Wings:* Vitreous. Long veins of forewing faintly marked with gray, those toward hind margin becoming paler. Subcosta of hindwing gray; all other veins of both wings pale. *Abdomen:* Tergites 2-7 hyaline yellow, thinly washed with black; dark, poorly marked triangles in antero-lateral areas; posterior margins each with a thin, sharp black line; from each postero-lateral corner a narrow black line extends forward above pleural fold a very short distance, then runs obliquely upward hall way to anterior margin. Segments 8-10 same color as mid-sections, but opaque. Sternites 1-7 each with a pair of submedian oblique hyaline dashes

starting from anterior margins, and each with a pair of submedian hyaline small spots. *Tails:* Smoky yellow, narrowly darker at joinings. *Size:* Body 6.3 mm. long; forewing 7 mm.; tails 12 mm.; foreleg 6 mm.

Female imago (in alcohol)

Body: Color uniformly pale yellow brown, tergites very lightly surfaced with black. *Legs:* Foreleg pale yellow, femur faintly smoky and with black hair-lines extending almost full length of segment; one hair line central on anterior surface and the other marking the dorsal edge. Legs 2 and 3 white, tarsi smoky. Fore tarsus black, contrasting strongly with other leg segments. *Size:* Body 6.7 mm. long; forewing 7 mm.; tails 12 mm.

Nymph (in alcohol)

Head: Pale yellow with labrum and fronto-clypeal area dark red brown; area between ocelli and lateral margins widely dark. *Thorax:* Pale yellow, lightly washed with black. *Legs:* Pale, all segments light brown in the middle. Coxae largely light brown. Claws yellow, fore claw bearing 16 denticles. *Abdomen:* Tergites 2-7 with conspicuous small submedian pale areas at anterior margin; starting at the edge of these pale spots, a wide, curved dark stripe joins posterior margin just above postero-lateral corner; posterior margins of all tergites broadly dark. Tergites 8-10 pale with some dark markings. Sternites pale yellow with posterior margins faintly dark across the median section, these becoming strongly dark as they approach the lateral margins. Segments 8 and 9 bear postero-lateral spines. *Gills:* Broadly lanceolate, divided almost to the base. Tracheae black and without branchlets. *Tails:* Yellow, unmarked at joinings. *Size:* Body 6 mm. long; tails 9 mm.

Holotype: Male imago; collected on MIDDLE CREEK, LAKE COUNTY, CALIFORNIA, May 28, 1949; in collection of California Academy of Sciences. *Allotype:* Female imago; same data; in collection of California Academy of Sciences. *Paratypes:* Two ♂ imagoes, 3 ♀ imagoes and 4 nymphs in author's collection. Same data as holotype.

The association of nymph and adult was established through rearing.

This species is the smallest *Paraleptophlebia* found to date in California. Adult males cannot go beyond couplet 12 in Traver's key to the species of *Paraleptophlebia* (1935. Biology of Mayflies, p. 512), as the tails are not ringed at the base. However, the tails of *P. californica* Traver often lack rings at the base, and *P. quisquilia*, the new species, might be considered closest in relationship to *P. californica;* apart from the differences in maculation, the difference of form of the genitalia of the two species serve to separate them. The cleft between the penes of *P. californica* is notably deep and wide, while that of *P. quisquilia* is very small by comparison. The type locality is 4.5 miles upstream, by road, from the town of Upper Lake.

Ameletus imbellis Day, new species

(Plate V, figures 2, 5 and 5a)

Male imago (in alcohol)

Head: Face and clypeus black brown; median carina light brown; vertex pale. Ocelli milky white ringed with black at base. Compound eyes nearly contiguous; no oblique band across eyes, but lower portions darker gray and with smaller facets. *Thorax:* Pronotum black brown with wide anterior and fine posterior and lateral pale margins. Mesonotum yellow brown with extensive darker lateral areas; anterior portion, scutellum and median suture, dark brown; two pale dots before the scutellum. Metanotum pale brown. Pleural sutures white; sclerites red brown; a wide black line runs obliquely downward from root of forewing. Sternum darker red brown than sclerites of pleuron. *Legs:* All coxae pale brown, with dark brown markings; narrowly margined with black. Fore trochanter and femur dark brown. Fore tibia and tarsus pale brown. Middle and hind legs pale yellow; joinings of tarsi narrowly black. *Wings:* Faintly milky, strongly so in stigmatic area of forewing. All veins in both wings medium brown, a few crossveins of forewing lightly clouded with brown; humeral brace dark brown. *Abdomen:* Segments 1, 8 9 and 10 opaque dark brown. Segments 2 and posterior half of 7, translucent medium brown. Tergites 3-6 are hyaline white with thin, broad dark brown surfacing in median and posterior areas; posterior margins widely pale. Sternites 2-7 hyaline yellow white with faint indications of darkened ganglia; on sternite 2, a pair of large dark brown median spots near anterior margin. *Genitalia:* Stimuli sharp and fine. Second joint of forceps bent strongly inward near base. *Tails:* Light brown, joinings pale. *Size:* Body 12 mm. long; forewing 11 mm; tails 15 mm.; foreleg 10.5 mm.

Female imago (in alcohol)

Description: Considerably darker than male imago. Notum concolorous dark brown. Tergites patterned as in male; dark areas more extensive and purple in tone. Sternites 2-7 hyaline pale purple-rose. Ovipositor very prominent and black in middle. Wing veins thicker and darker than in male imago; crossveins more heavily clouded; humeral brace black brown. *Size:* Body 10 mm. long; forewing 10.5 mm.; tails 14 mm.

Nymph

Features of the nymph that can be determined from the cast skin show tails widely banded with dark in the middle area. Gills with short chitinous band about one-quarter distant from the dorsal edge.

Holotype: Male imago; collected on Sage Creek, Napa County, California, April 4, 1950; in collection of California Academy of Sciences. *Allotype:* Female imago; same data; in collection of California Academy of Sciences. *Paratypes:* 3 ♂ imagoes from Sage Creek April 4, 1950; 10 ♂ imagoes and 8 ♀ imagoes from Sage Creek, March 18, 1951; 5 ♂ imagoes and 7 ♀ imagoes from Little Stoney Creek, Colusa County, California, April 21, 1951; 1 ♂ imago; 1 ♀ imago; 1 nymph in collection of G. F. Edmunds, Jr.; others in author's collection.

This species is very close to *A. amador* Mayo, but can be distinguished from the latter by the much sharper inward bend of the second segment of the forceps. The holotype of *A. amador* and 3 additional paratype ♂ imagoes loaned by Dr. Mayo show the second segment of the forceps to be smoothly and evenly curved exactly as illustrated in her paper (1939:151). The appearance of the sharp inward bend of the second segment of the forceps of *A. imbellis* is constant in 20 ♂ imagoes collected from two different locations in two separate years.

Ameletus facilis Day, new species

(Plate V, Figures 6 and 6a)

Male imago (in alcohol)

Head: Velvety black brown with small pale spot before lateral ocelli and fine white circular line around antennal sclerite; narrow pale line on upper edge of median carina. Compound eyes dark gray, darker in lower portion and contiguous above. *Thorax:* Pronotum velvety black brown with fine white line on posterior margin and small white areas in postero-lateral corners. Mesonotum pale yellow brown with dark shading laterally and in postero-lateral areas; scutellum yellow brown narrowly margined with black brown; postscutellum dark brown. Metanotal scutellum as in mesonotum. *Legs:* Foreleg dark brown; tarsus only a shade lighter than other joints. Legs 2 and 3 pale yellow; coxae pale, widely marked with brown and edged with black; coxal processes mostly dark brown. *Wings:* Vitreous. Stigmatic area of forewing strongly brown tinted. Brown spot at base of forewing. All veins of both wings amber; humeral braces amber. *Abdomen:* Segments 1, 8, 9 and 10 opaque brown. Tergites 2-7 semi-hyaline palest cream with smoky areas on posterior third, somewhat darker in postero-lateral corners. Tergite 2 almost entirely pale, with following tergites progressively more broadly darkened, 7 being almost entirely dark brown. Sternites 2-7 semi-hyaline white with opaque white ganglionic areas. Short, faint central submedian brown dashes on sternites 1 and 2. *Tails:* Pale yellow brown, the paler joinings of each section narrowly margined with dark brown. *Size:* Body 10.5 mm. long; forewing 10.5 mm.; tails 14 mm.; foreleg 9 mm.

Holotype: Male imago; collected on Sage Creek, Napa County, California, April 22, 1950; in collection of California Academy of Sciences. *Allotype:* Female imago; collected on Smith Creek, Santa Clara County, California, April 7, 1951; in collection of California Academy of Sciences. *Paratypes:* 1 ♂ imago and 1 ♀ imago, same data as holotype, in collection of California Academy of Sciences; 1 ♂ imago, 1 ♀ imago, 1 nymph, same data as holotype, in collection of G. F. Edmunds, Jr.; 10 ♂ imagoes and 9 ♀ imagoes from Smith Creek, April 7, 1951, in author's collection. Males key to *Ameletus* (1935:447), and *A. facilis*, n. sp. is closely related to

PLATE I, *Paraleptophlebia helena*

Fig. 1 genitalia, ventral aspect. Fig. 2 genitalia, lateral aspect. Fig. 3 mandibles of nymph. Fig. 4 tergites of nymph, 6, 7 and 8. Fig. 5 subanal plate, female imago. Fig. 6 gills of nymph, 1 and 4.

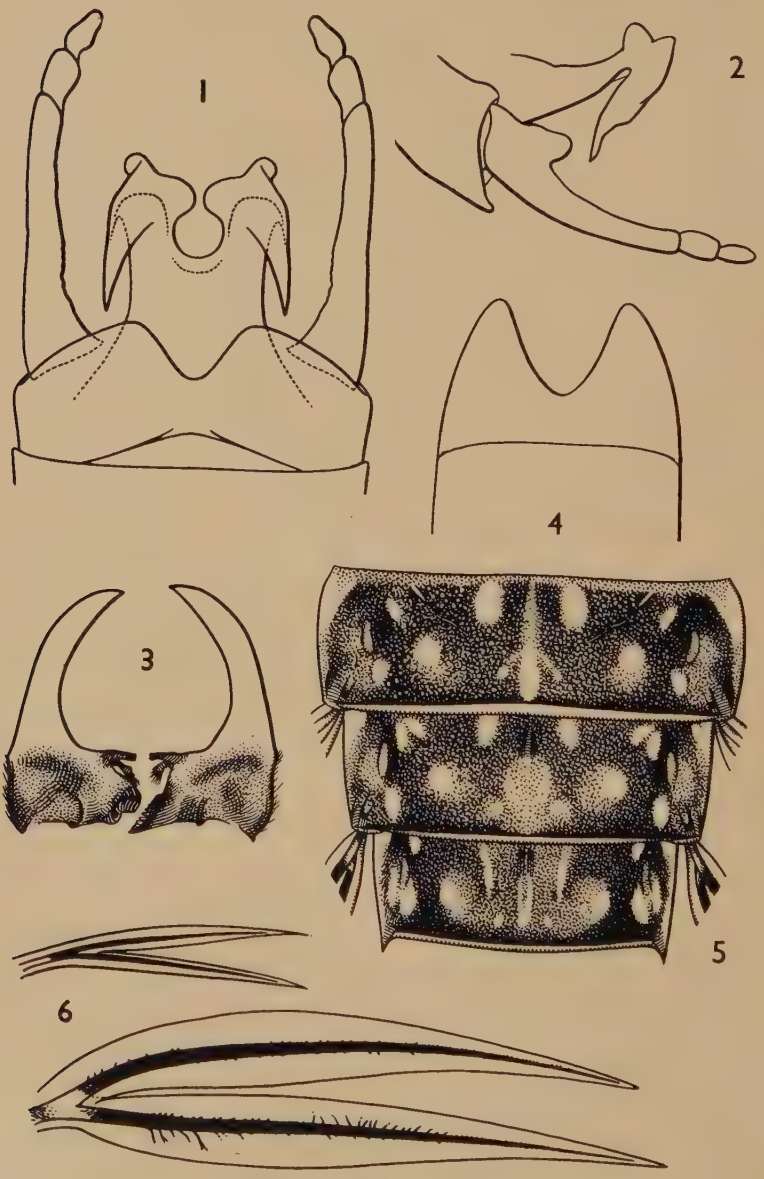

PLATE II, *Paraleptophlebia zayante*

Fig. 1 genitalia, ventral aspect. Fig. 2 genitalia, lateral aspect. Fig. 3 mandibles of nymph. Fig. 4 subanal plate, female imago. Fig. 5 tergites of nymph, 6, 7 and 8. Fig. 6 gills of nymph, 1 and 4.

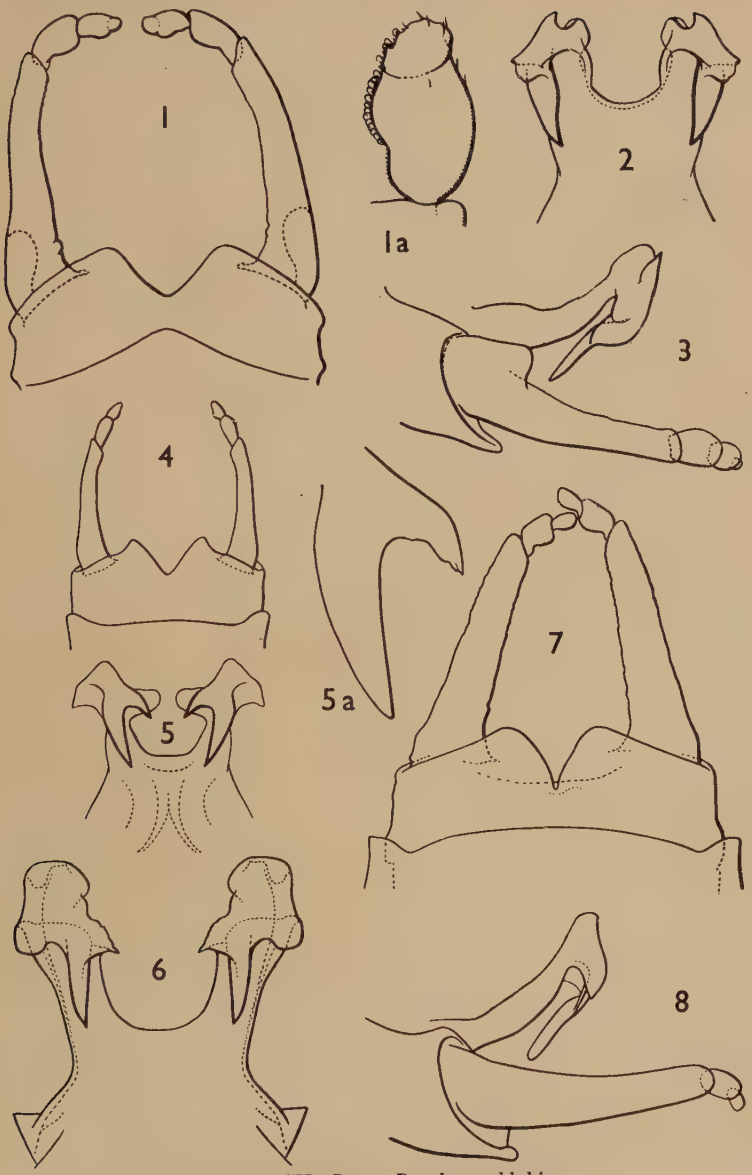

PLATE III, Genus *Paraleptophlebia*

Fig. 1 *P. packii*, forceps, ventral aspect. Fig. 1a *P. packii*, terminal joint of forceps. Fig. 2 *P. packii*, penes, ventral aspect. Fig. 3 *P. packii*, genitalia, lateral aspect. Fig. 4 *P. bicornuta*, forceps, ventral aspect. Fig. 5 *P. bicornuta*, penes, ventral aspect. Fig. 5a *P. bicornuta*, reflex spur. Fig. 6 *P. californica*, penes, ventral aspect. Fig. 7 *P. californica*, forceps, ventral aspect. Fig. 8 *P. californica*, genitalia, lateral aspect.

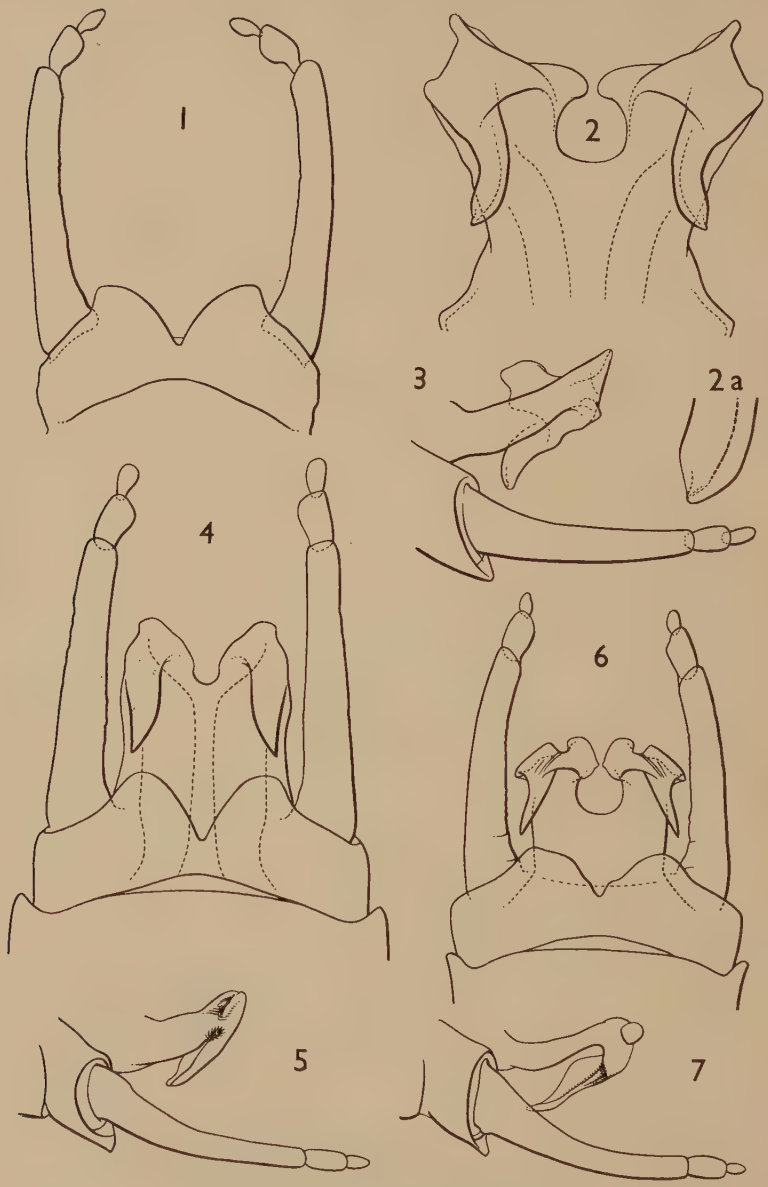

PLATE IV, Genus *Paraleptophlebia*

Fig. 1 *P. associata,* forceps, ventral aspect. Fig. 2 *P. associata,* penes, ventral aspect. Fig. 2a *P. associata,* tip of reflex spur. Fig. 3 *P. associata,* genitalia, lateral aspect. Fig. 4 *P. genitalia,* ventral aspect. Fig. 5 *P. clara,* genitalia, lateral aspect. Fig. 6 *P. quisquilia,* genitalia, ventral aspect. Fig. 7 *P. quisquilia,* genitalia, lateral aspect.

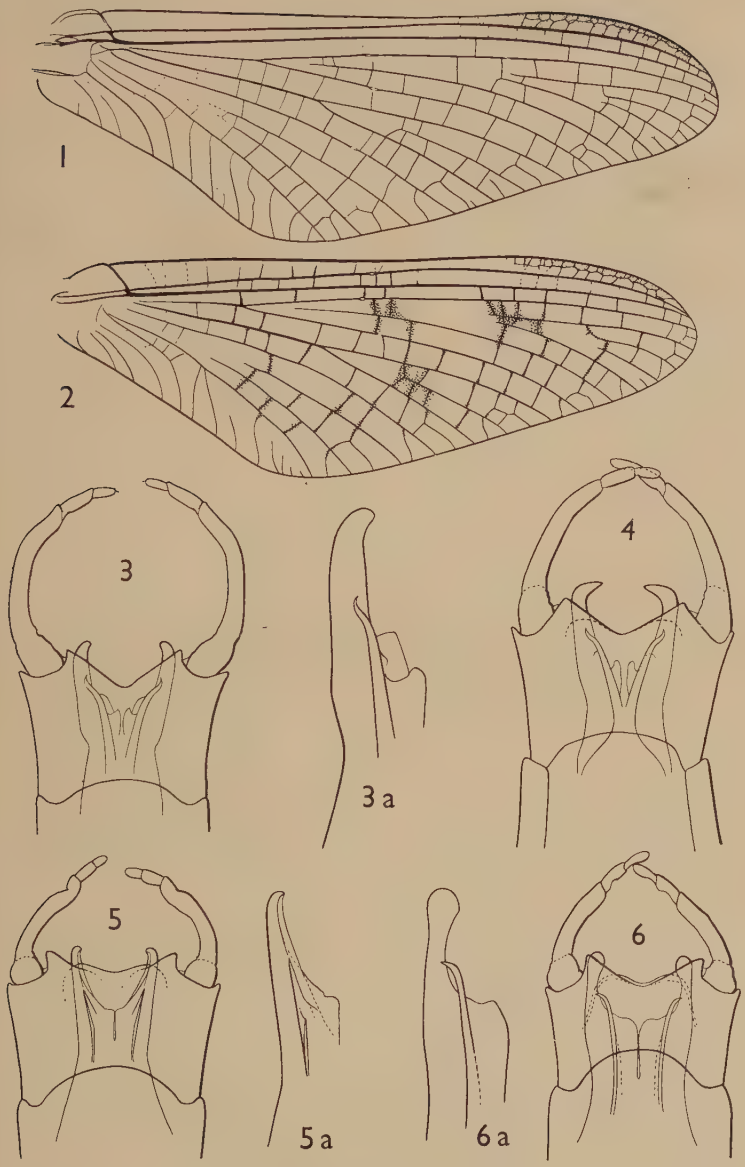

PLATE V, Genus *Ameletus*

Fig. 1 *A. dissitus*, forewing, male imago. Fig. 2 *A. imbellis*, forewing, male imago. Fig. 3 *A. dissitus*, genitalia, ventral aspect. Fig. 3a *A. dissitus*, penes, lateral aspect. Fig. 4 *A. dissitus*, genitalia, ventral aspect, showing distorted penes. Fig. 5 *A. imbellis*, genitalia, ventral aspect. Fig. 5a *A. imbellis*, left half of penes, ventral aspect. Fig. 6 *A. facilis*, genitalia, ventral aspect. Fig. 6a *A. facilis*, left half of penes, ventral aspect.

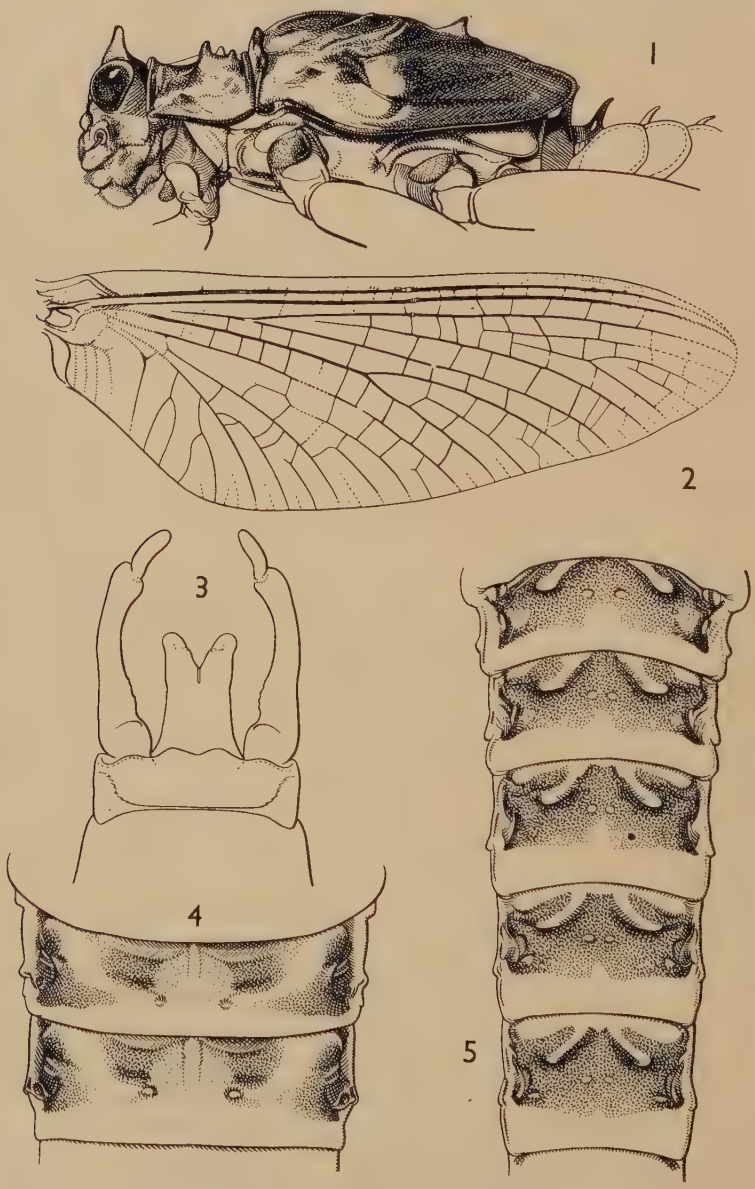

PLATE VI, *Ephemerella glacialis carsona*

Fig. 1 nymph, head and thorax, lateral aspect. Fig. 2 forewing, male imago. Fig. 3 genitalia, ventral aspect. Fig. 4 tergites of male imago, 2 and 3. Fig. 5 sternites of male imago, 2, 3, 4, 5 and 6.

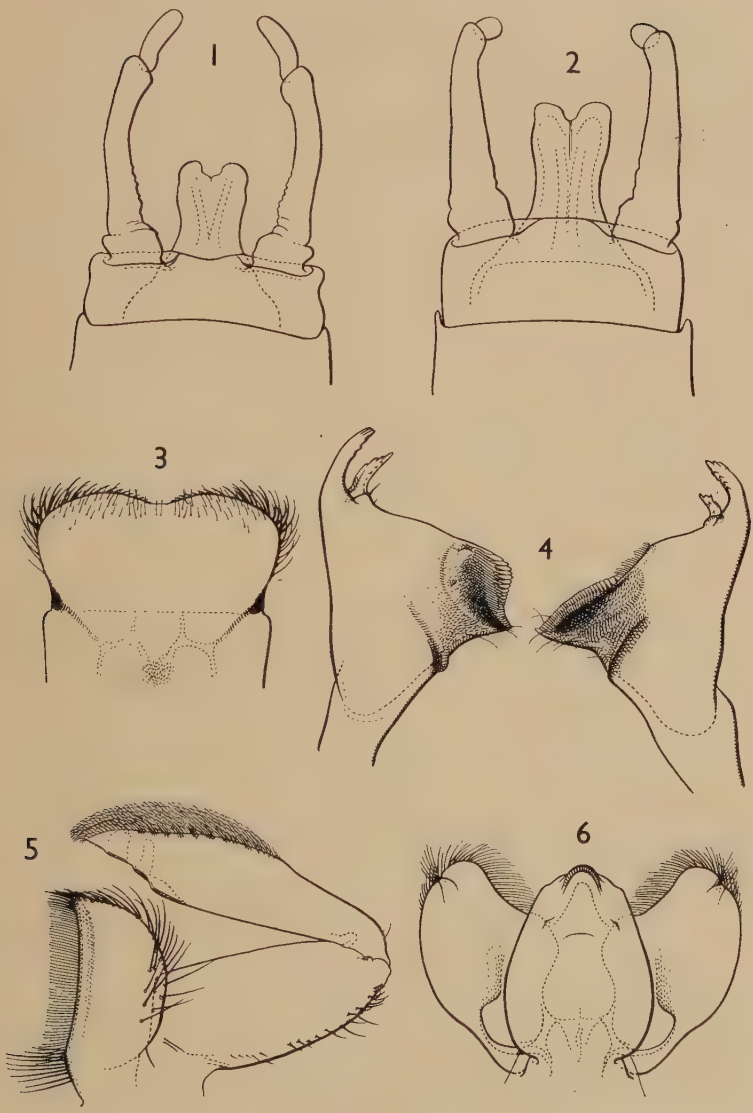

PLATE VII

Fig. 1 *Ephemerella spinifera,* genitalia, ventral aspect. Fig. 2 *Ephemerella cognata,* genitalia, ventral aspect. Fig. 3 *Ironodes lepidus,* labrum of nymph. Fig. 4 *Ironodes lepidus,* mandibles of nymph. Fig. 5 *Ironodes lepidus,* maxilla of nymph. Fig. 6 *Ironodes lepidus,* hypopharynx of nymph.

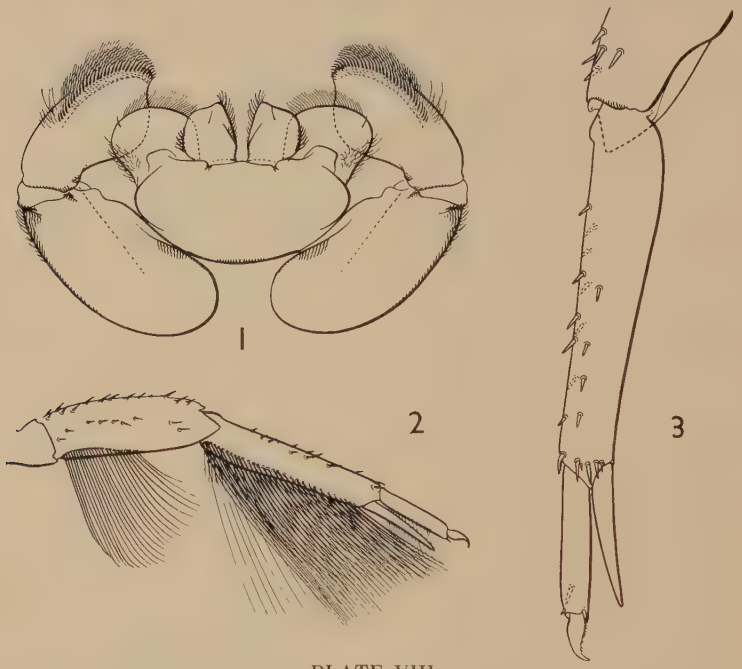

PLATE VIII

Fig. 1 *Ironodes lepidus*, labium of nymph. Fig. 2 *Isonychia velma*, foreleg of nymph. Fig. 3 *Isonychia velma*, fore tibia and tarsus of nymph.

A. aequivocus McDunnough. From the latter species. *A. facilis* may be distinguished by details of the genitalia. Comparatively, the penes of *A. facilis* are widely separated and clubbed at the apices; the stimuli are bent outward at right angles at the tips.

Ephemerella glacialis carsona Day, new subspecies

(Plate VI)

Male imago (in alcohol)

Head: Dark yellow brown with black spots in front of compound eyes; a fine pale median line on vertex bordered on each side by narrow black lines; ridge of median carina black. Clypeus hyaline brown, emarginated with deep V-shaped notch at center. Light brown antennae set in white circles at base. Ocelli milky white, black at bases. Eyes nearly contiguous, upper portion pale yellow and lower portion black. *Thorax:* Pronotum dark yellow brown with median raised ridge finely black. A thin black lateral ridge halfway between margins extends almost entirely across the breadth of the segment. Mesonotum red brown, paler on sides; scutellum edged with black, with narrow median double black line extending forward from tip, and large median pale area anterior to end of this double line. Pleural sclerites dark brown, unsclerotized portions widely pale yellow. Sternum somewhat darker red brown than mesonotum. *Legs:* Foreleg red brown, basal third

of femur and tarsus paler. Middle and hind legs creamy, apical halves of femora ruddy brown. All coxae creamy with limited brown markings, each coxa reinforced strongly with a high, chitinous ridge extending its full length. Fore trochanter brown, others pale. *Wings:* Hyaline. Stigmatic area of forewing clouded and faintly brown. Wing veins strong red brown except that the crossveins between Costa and R_1 are entirely pale, with those in the apical quarter of the forewing faintly brown in this narrow strip. The intercaleries of the forewing are pale brown and those of the hindwing mostly colorless. Long veins of the forewing are pale at the base, as is the costal vein of the hindwing. Crossveins of stigmatic area of forewing irregularly anastomosed. *Abdomen:* Deep ruddy widely marked with creamy white, sternites slightly darker. A wide creamy line extends the full length of the pleural fold. Wide creamy posterior margins of each segment give the abdomen a strongly marked annulate appearance. Tergites 1-8 have similar patterns, and are as shown in Plate VI, fig. 4. Tergite 9 ruddy with pale lateral and posterior margins. Sternites as shown in Plate VI, fig. 5. *Genitalia:* Styliger plate, penes and first two joints of forceps blackish brown with apical joint paler. *Tails:* Deep ruddy brown at base, paling to white at tips; joinings darker in dark portion only. *Size:* Body 18 mm. long; forewing 18 mm.; tails 21 mm.; foreleg 13 mm. Percentage of parts to total length of foreleg: femur, 29.3; tibia, 33.2; T_1 12.2; T_2 12.2; T_3 8.8; T_4 4.3.

Nymph (in alcohol)

Head: No frontal shelf. Five low, rounded tubercles on face, two below and three between the antennae. Wide, raised median carina, crossed in middle by another ridge. Occipital tubercles prominent, tapering to a blunt point. *Thorax:* Prothorax mottled black brown. Submedian tubercles, three on each side arranged as follows: the anterior tubercle is high and blunt; the posterior pair are small and unequal, the median being lower and set somewhat further forward. The submarginal tubercles, one on each side, are about two-thirds as high as the anterior submedian tubercles, but much finer. At the antero-lateral corner, a small marginal spine. Mesonotum mottled black brown. A short distance behind the anterior margin a narrow, low ridge extends from median line to antero-lateral corner; on this ridge and just below the median line is a small tubercle; on same ridge, a small tubercle is halfway distant from median to lateral margin. The principal mesonotal submedian tubercles arise from long, low, well-formed ridges, one on each side. The ridge is higher and much better defined than in *E. grandis* Eaton, and lower than in *E. glacialis glacialis* Traver. The tubercle arising from the ridge varies from one-third to one-half the height of a well developed tubercle of *E. g. glacialis*. The median posterior tubercle is larger than in *E. g. glacialis*. *Legs:* Femora dark red brown, unmodified by teeth or spines, and somewhat flattened. Tibiae red brown with dark band in center. Tarsi black in proximal portion. Claws black and with 7-8 spines. *Abdomen:* Lateral spines well developed on segments 4-9; much smaller on 3 and lacking on 2. Gills on segments 3-7. Dorsal spines very prominent; smallest and closest together on 2, larger and further apart on 3, higher and in parallel lines on 4-7; all incurved and backward bent at tips. Spines on 8 and 9 are heavier and 40% longer than those of 4-7; those on segment 8 are stouter than 9, and beset

with a few long hairs. Sternites blackish brown with vague wide pale median stripe on 1-8, and short black submedian dashes from anterior margin, and curved black dashes near lateral margins. *Tails:* Alternately black brown and yellow. *Size:* Body, 18 mm. long; tails, 12 mm.

Holotype: Male imago; reared from nymph collected by Helen L. Day at Hangmans Bridge, East Fork Carson River, Alpine County, California, July 3, 1950; in collection of California Academy of Sciences, together with nymphal shuck. *Paratypes:* 1 nymph at California Academy of Sciences; 1 ♂ imago and 1 nymph in collection of George F. Edmunds, Jr.; 12 nymphs in author's collection; all topotypical.

The nymph is dull black brown, sometimes with wide pale median stripe from vextex to tergite 10. While this subspecies may prove to be only a variation of typical *E. glacialis* Traver, the adult of the latter is unknown, and comparisons of the nymphs with all the specimens of typical *E. glacialis* in the Cornell University collection show consistent differences in the height of the mesonotal tubercles. There is some difference in the height of the mesonotal tubercles in the Cornell specimens, as is true with the Carson River nymphs, but the range and the average height of the latter is much lower. Mr. George F. Edmunds, Jr., of the University of Utah has examined the material and has concurred with my belief that this should be named as a subspecies of *E. glacialis*.

The type locality of *E. glacialis* is given as Glacier National Park, Montana, and Eaton's Nymph No. 2, Revis. Monogr., p. 131, which is probably the same species, was described from Washington; this species has not been reported elsewhere. It appears that sufficient physical separation exists between *E. glacialis glacialis* and *E. glacialis carsona* to permit the subspeciation indicated.

Western *Paraleptophlebia* Having Nymphs With Tusked Mandibles

For comparison with *P. zayante* and *P. helena*, described above, George F. Edmunds, Jr., of the University of Utah very kindly presented me with adult and nymphal specimens of *P. packii* Needham and *P. bicornuta* McDunnough. Genitalia drawings of these two longer-known species are given. Plate III, figures 1, 1a, 2, 3, 4, 5 and 5a.

Paraleptophlebia californica Traver

(Plate III, figures 6, 7 and 8)

Paraleptophlebia californica Traver, 1934. Jour. Elisha Mitchell Sci. Soc. 50:195.

After examining the type material from Cornell University collection, and with additional material available, new genitalia drawings are given herewith as an aid to the identification of this species.

Paraleptophlebia associata McDunnough

(Plate IV, figures 1, 2, 2a and 3)

Leptophlebia associata McDunnough, 1924. Canad. Ent. 56:221.
Paraleptophlebia compar Traver, 1934. Jour. Elisha Mitchell Sci. Soc. 50:193.

The writer has examined the paratype genitalia slide of *Paraleptophlebia associata* McDunnough No. 818 in the Canadian National Collection, referred to by Dr. James McDunnough (1924: 221) and has examined the types and paratypes of *Paraleptophlebia compar* Traver in the Cornell University collection, and believes that only one species is involved. *Leptophlebia associata* was transferred to *Paraleptophlebia* by Dr. J. R. Traver in 1934. It is the writer's belief that *P. compar* is a synonym of *P. associata*. The species is very widespread in northern California, having been collected by the author in Plumas, Alpine, Sonoma, Napa, Alameda, San Mateo, Stanislaus and Contra Costa counties, and on Waddell Creek, Santa Cruz County, the type locality of *P. compar*.

The coloration of this species, like others of this genus in California, varies considerably in fresh specimens taken from different streams, so the details of coloration are of dubious value in descriptions for species with any considerable distribution.

In the species under discussion, the reflex spurs of the penes are sometimes bent ventrally very sharply, causing them to appear quite short when viewed from below; there is considerable variation as to degree of lateral bending, the more sharply bent appearing shorter. The reflex spurs of the penes mounted on Slide 818 of the Canadian National Collection are bent ventrally and laterally quite strongly.

The published drawing of Slide 818 above referred to does not show the true appearance of the penes or spurs mounted on this slide. One important detail omitted is an easily seen "tuck" that produces a small protuberance at the end of each reflex spur. This protuberance is seen on Slide 818, all specimens from Cornell University, and all specimens collected by the present writer; it is shown on Plate IV, figs. 2 and 2a of this paper.

PARALEPTOPHLEBIA CLARA McDunnough

(Plate IV, figures 4 and 5)

Leptophlebia clara McDunnough, 1933, Canad. Ent. 65:155.

After examining a paratype of this species from the Canadian National Collection, and with additional material of the writer's collecting available, new genitalia drawings are given herewith as an aid to identification. When the penes is cleared and mounted, the large seminal ducts are very prominent and distinctive, and are seen to be a strong dark purple. The male imago has been found to be highly variable in color.

AMELETUS DISSITUS Eaton

(Plate V, figures 1, 3, 3a and 4)

Ameletus dissitus Eaton, 1885. Trans. Linn. Soc. London, Sec. Ser. Zool. 3:210.

On March 24, 1950, male imagoes of *Ameletus dissitus* Eaton were collected on Sage Creek, Napa County, California. The identification was made positive through the kindness of Mr. D. E. Kimmins of the British Museum (Natural History), who compared two genitalia slides from the writer's collection with the mounted genitalia of Eaton's paralectotype of *A. dissitus*. One important feature of the genitalia of this species has not been detailed in some prior drawings, and is shown on Plate V, figs. 3 and 3a; the apical ends of the stimuli are formed into sharp hooks which are easily seen and quite distinctive.

On Plate V, fig. 4, there is shown another specimen of *A. dissitus* with the apical ends of the penes fixed in a different position at the time of death; this example was collected at the same time and place as those referred to above.

EPHEMERELLA SPINIFERA Needham

(Plate VII, figure 1)

Ephemerella spinifera Needham, 1927. Ann. Ent. Soc. Amer. 20:110.

The undescribed male adult of this species has been reared from nymphs taken from the East Fork of the Carson River, near Hangmans Bridge, Alpine County, California, July 4, 1949. Description of the male imago (in alcohol) is as follows:

Head: Pale yellow; median portion of face beside the median carina, and median portion of clypeus darker. Eyes light orange brown in upper portion with lower portion black. *Thorax:* Pronotum yellow brown with narrow median and lateral lines purplish-black. Mesonotum brown yellow, a somewhat darker and very wide stripe along entire median area; narrowly purple black on postero-lateral margins. Wide white bands above base of fore coxae. Basisternum of prothorax light yellow, marked with strong purple brown curved lines along antero-lateral margin and across posterior margin. Basisternum of

mesothorax white; furcisternum dark red brown with white sutures. *Legs:* All femora white at base, graduating to deep purple rose apically. Fore tibiae pink. All other leg segments white. Tarsi faintly marked with smoky. *Wings:* Faintly milky, strongly so along the costal strip. All veins dark red brown; humeral brace milky white. *Abdomen:* Tergites bright purple rose, anterior median portions pale. Tergites 4-10 with posterior margins white; marked with fine median broken black line. A wide white stripe extends full length of abdomen along pleural fold; postero-lateral corners of all tergites white. Sternites same shade as tergites; posterior margins widely white. Sternites 2-9 each with a pair of pale curved submedian dashes based on anterior margin; each sternite with a pair of small pale submedian spots mid-distant between anterior and posterior margins. *Genitalia:* Forceps purple rose. Penes black brown. *Tails:* Dark purple brown at base, lightening to white apically; joinings dark red purple. *Size:* Body 13 mm. long; forewing 15 mm.; tails 16 mm.; foreleg 12.5 mm.

Ephemerella cognata Traver

(Plate VII, figure 2)

Ephemerella cognata Traver, 1934. J. Elisha Mitchell Sci. Soc. 50:231.

The undescribed adult male of this species has been reared from nymphs taken from San Gregorio Creek, San Mateo County, June 17, 1950; from Sage Creek in Napa County; from Sonoma Creek in Sonoma County and from Waddell Creek in Santa Cruz County, the latter being the type locality. All counties named are in California. Description of the male adult (in alcohol) is as follows:

Head: Blackish-brown with pale median line on vertex; clypeus and nasal carina hyaline yellow. Antennal sclerite white. *Thorax:* Pronotum, mesonotum and sternum blackish-brown. Pleural sutures paler. *Legs:* Foreleg medium brown. Middle and hind legs white, the apices of the tibiae sometimes faintly brown. *Wings:* Faintly milky, strongly so in stigmatic areas; dark brown areas at bases of wings. A long axial cord is present as in *Ephemerella tibialis* McDunnough; this cord extends almost to tip of scutellum and then projects backward .3 mm. beyond the scutellum. All veins are colorless; so completely vitreous that they are easily seen against the slight milkiness of the wings. *Abdomen:* Segments 2-7 semi-hyaline yellow green. Dorsum and sternum concolorous. Tergites with dark posterior margins, broadest in median area; fine, broken, double, dark median stripe. Sternites show ganglionic areas as white opaque and/or hyaline; small dark spots near antero-lateral corners. *Genitalia:* As shown on Plate VII, fig. 2. *Tails:* Clear hyaline white, narrowly marked with brownish red at each joining. *Size:* Body 7 mm. long; forewing 8 mm.; tails 9 mm.; foreleg 7.5 mm.

Ironodes lepidus Traver

(Plate VII, figures 3, 4, 5 and 6; Plate VIII, figure 1)

Ironodes lepidus Traver, 1935. Canad. Ent. 67:35.

The undescribed nymph of this species has been associated with

the male adult through rearing, and drawings of nymphal mouthparts are given that may be helpful in the further study of this genus. Nymphs were collected on a small tributary of Hamilton Branch, North Fork of Feather River, Plumas County, California, on May 29, 1950.

In alcohol, the entire dorsum of this nymph is dark red brown. Before each ocellus, a pale yellow spot. On the pronotum, a fine, dark raised ridge extends nearly the full width across; it is parallel to and one-third the length of the pronotum behind the anterior margin. Mesonotum vaguely marbled with lighter brown. Basisternum of prothorax outlined in dark brown on lateral and posterior margins; a small yellow brown central area. Median area of mesosternum and metasternum yellow brown; all other surfaces of sternum white. On well marked specimens, a small pale spot at the base of each submedian abdominal spine. Sternites yellow brown with dark brown lateral streaks; a pair of pale submedian oblique dashes arise from anterior margin on each sternite. Lamellate portions of gills dark red brown with central portion white to base; fibrilliform portions lavender; trachaea of gills not visible in reflected light. Legs dark red brown with black brown tarsi narrowly banded with yellow at proximal end. Anterior surfaces of femora with white area in middle, and white line extending to base; posterior surfaces with wide white stripe from base almost to apical end.

The nymphs of *I. lepidus* were found only in very fast water. Emerging at 2:00 p.m. on Hamilton Branch tributary, they crawled almost out of water on rough rock, waited for from 3 to 5 minutes, broke out of the nymphal skin, crawled to a dry portion of rock and dried the wings for up to 9 minutes before flying to low branches at the water's edge.

ISONYCHIA VELMA Needham

(Plate VIII, figures 2 and 3)

Isonychia velma Needham, 1932. Canad. Ent. 64:273.

The undescribed nymph has been associated with the male adult through rearing. This species is very widespread in northern California, found to date in large rivers such as the Klamath, Trinity, Russian, and Putah Creek. It has been found always in shallow, fast riffles, frequently on wood. The body of the mature nymph is as long as 20 mm. The description of the nymph follows:

Entire body an even tone of darkest yellow brown; head almost black. Basal segment of antennae very dark, as is pedicel; flagellum dark at base, paling apically. Tergites with faint, narrow pale median stripe in anterior halves; this stripe is paralleled by a submedian pale stripe on each side. Tergites and sternites with fine black lateral margins and finest black posterior margins; latter beset with fine, short spinules. Sternites with short, pale oblique streaks based on median point of anterior margin; just beyond the posterior ends of these, a series of four small pale spots, two on each side, are in line across the sternite. Gills pale gray brown with wide chitinous ridge along lower edge; an interior band of chitin across the gill one-third distant below the dorsal edge. Fore femur dark brown with wide pale apical band, and pale area in middle. Fore tibia pale with wide dark band toward proximal end. Fore tarsus black brown in proximal half and pale apically. Claws pale with small black tips. Spur at apical end of fore tibia varies from two-thirds to full length of fore tarsus; 16-20 spines on each fore tibia; 8-9 teeth on fore claw, irregularly spaced.

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A NEW SPECIES OF NITIDULID BEETLE FROM CHILE
(Coleoptera)

L. R. GILLOGLY
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Eumystrops chilensis Gillogly, new species

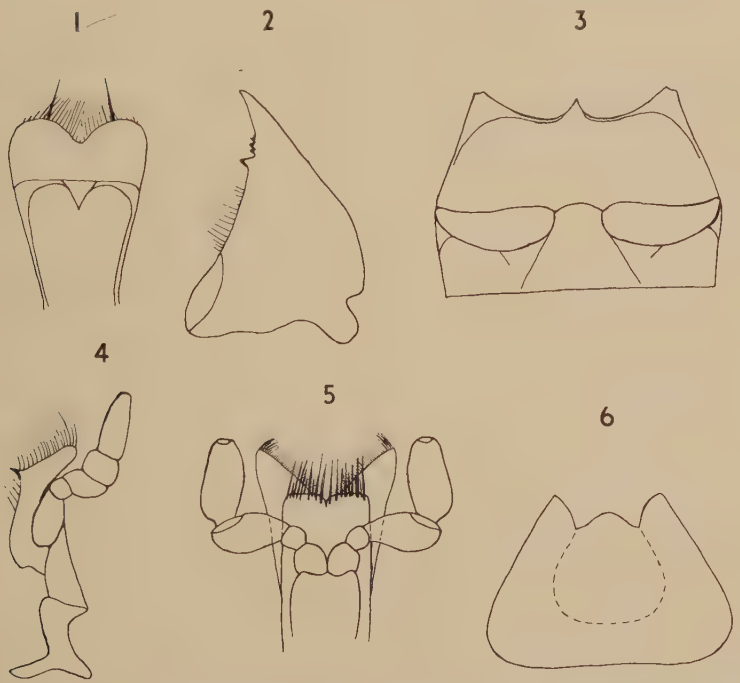
Oval, slightly oblong, convex, shining; clothed with close-lying, silvery-white, rather long pubescence; individuals vary in color from luteus to piceus, light colored specimens have metasternum dark and dark markings on the elytra just behind the middle while the dark specimens have two light longitudinal marks near the suture anterior to the middle. *Head* coarsely punctate. Eyes larger and globular. Antennae, having basal segment little dilated, second less dilated, third slender equal in length to second, 3 to 8 slender and progressively shorter until 8 which is nearly spherical, club 3-segmented, ovate and compact. Antennal grooves convergent, if extended they would meet at a point between anterior coxae. Pronotum with width to length as 1.7 to 1, sides rounded, not narrowing posteriorly, moderately expanded, reflexed, with hind angles bluntly rectangular and projecting back somewhat, hind edge narrowly margined, feebly bisinuate. Elytra entire, conjointly rounded, edges reflexed, not serially punctate. Scutellum triangular, rather small. Pygidium small, completely covered by elytra, closely punctate. None of the other dorsal segments of the abdomen chitinized. Prosternum moderately punctate, process slender and somewhat expanded at tip. Mesosternum short, carinate in middle beneath prosternal process. Mesocoxae close together. Metasternum short, equal in length to first two abdominal segments together, axillary space extending back along episternal suture about three-fourths of distance to hind coxae, median area somewhat depressed. Hind coxae separated by distance equal to width of second abdominal segment, abdominal lobe between coxae nearly truncate, on each side a divergent raised line accentuated by a slight depression along its inner side, the line extends back across entire width of first abdominal segment diverging at about 45 degrees from longitudinal axis. Surface of ventral abdominal segments and metasternum covered with reticulations except for area between divergent lines on first segment which is completely smooth. Mouthparts: Labrum bilobed; mandibles, straight and projecting forward, several small teeth preceding a larger tooth before the tip, grinding surface on inner side of base; maxillae, lacinia broadly truncate, a definite spur on inner edge, tip very densely covered with long setae, palpi first segment small, second short and clavate, third equal to second but more nearly cylindrical, fourth as long as first three together. Labium: Ligula truncate, armed with long stout setae; paraglossae large, transparent, closely fringed with fine setae; palpi with first segment small, second subclavate and swollen, third equal in length to second, cylindrical. Legs short and stout. Tarsi, first three segments broadly dilated and densely pubescent beneath. Claws simple. Length 2.8 to 3.3 mm.

The species was collected by Luis E. Peña while beating native plants in the valley of Las Palmas, COQUIMBO, CHILE, September

30, 1947. *Holotype* and *allotype* are placed in the California Academy of Sciences. *Paratypes*: Sociedad Cientifica Chilena "Claudio Gay"; U. S. National Museum; American Museum of Natural History; and in the author's collection. The new species differs from the only other member of the genus as shown in the following table:

COMPARATIVE TABLE

	Eumystrops chilensis	*Eumystrops centralis*
Punctation:	rather coarse	minute, not dense
Pubescence:	close-lying, silvery-white, conspicuous, as in *Epuraea populi* Dodge	fine, inconspicuous
Head:	strongly punctate	very feebly punctate
Scutellum:	of moderate size	rather large
Elytra:	entire, conjointly rounded	short and broad, truncate behind
Pygidium:	small, covered by elytra, very closely punctate	very broad, exposed, very obsoletely punctate, almost smooth



Figs. 1-6. *Eumystrops chilensis* n. sp. Fig. 1 labrum, 2. mandible, 3. metasternum and first ventral abdominal segment to show "axillary space" and diverging post coxal lines, 4. maxilla, 5. labium, 6. mentum.

Sharp erected the genus *Eumystrops* in 1898 for a species from Panama and while this species agrees very closely with his definition, he did not figure the mouthparts, so when an undoubted *Eumystrops* sp. becomes available for dissection this new species may be shown to represent a distinct genus. The pronounced spur on the inner edge of the lacinia distinguishes *E. chilensis* from most other Nitidulidae. It is present, however, in two species of *Cillaeus* and the single species *Ithyphenes gnatho* Murray. In many respects the mouthparts are similar to those of *Cyllodes* and *Camptodes*. The post coxal line on the first abdominal segment is a good distinguishing character and is present in varying degrees in several related genera. In *Psilotus* and *Camptodes* it appears as a continuous line enclosing a narrow transverse space behind the coxae. In *Pallodes* the area enclosed reaches nearly half way across the width of the segment with its outer margin strongly sinuate. In *Stelidota* the line encloses a broad triangular space which varies somewhat from species to species but extends about half way across the segment. In *Prometopia* the line extends across about two-thirds of the width of the segment with the outer portion sinuate and the inner portion straight. This post coxal line is broken in *Eumystrops* with the straight inner piece extended nearly across the segment while the other portion of the line is short but easily visible (fig. 3).

Book Notice

American Social Insects. By Charles D. Michener and Mary H. Michener. D. Van Nostrand Company, Inc., Toronto, N. Y., London, xiv + 267, 109 Plates. 1951. Price $6.00.

This book on the habits and life histories of the bees, wasps, hornets, ants and termites is a worthy addition to the many books which have been written on this fascinating subject. Its organization, from the first chapter on "What are social insects?" to the last on "Societies of insects and man," has been carefully considered. In addition the last 24 pages are devoted to a short appendix on insect structure and classification, a bibliography, a concise glossary and an index. The text is based on the contributions of both past and present workers as well as on the personal observations and researches of the two authors in the United States, Mexico and Central America. However, the style of writing is largely non-technical and is coupled with a modest use of anthropomorhisms. The 109 full page plates, 30 in color, are in addition to the 267 pages of textual material and represent the efforts of some of the best nature photographers in this country. These illustrations, interleaved with the text, serve both to inform and delight the reader with their artistry.

The Micheners are to be congratulated for a book that contains such a wealth of clearly presented subject matter as to make it a source of enjoyment for naturalists for many years to come.—J. W. MacSwain.

NEW AND INTERESTING SPECIES OF DERMESTIDAE
(Coleoptera)

VLADIMIR KALIK
Pardubice, Czechoslovakia

Through the kindness of H. B. Leech and E. C. Van Dyke, I have been able to study some of the Dermestidae from the collection of the California Academy of Sciences, San Francisco. Many interesting species were found, and several of them are treated in the following article.

Dermestes reductus Kalik, new species

Form and color: Oblong, relatively narrow, moderately convex. Prothorax rather flat, broadest in the posterior third, narrowing more to the front, slightly to the base. Elytra as broad as the prothorax, with subparallel sides narrowing gradually in the posterior third. Dorsal surface and under side black. Antennae of 11 segments, reddish brown, with red club. Tarsi brown. *Pubescence:* Upper surface clothed with black and grayish-white hairs. Grayish-white hairs covering almost the whole head, forming several spots on the anterior and posterior margins and one spot on either side of the pronotum; a sparse but long pubescence covers the basal margin and posterior angles of the pronotum; the grayish-white hairs form a broad transverse band on the basal two-fifths of the elytra. This band encloses on each elytron a basal, oval, black spot not reaching either the shoulder or the scutellum; the black hairs form three distinct spots almost in the middle of the band, as in *D. lardarius* Linnaeus. Scutellum with black pubescence. Undersurface covered with predominantly grayish-white hairs; on the legs and ventral segments they are mixed with brown hairs, which predominate especially on the last two to three segments of the abdomen. *Punctation:* Surface closely punctured, those on the pronotum close together, the distance between them smaller than the diameter of one puncture; elytral punctation slightly sparser; under side finely and relatively sparsely punctured. *Sexual characters:* The male has a small fovea with a brush of yellow hairs on the median line of each of the 3rd and 4th abdominal sternites. Aedeagus small, curved, widest at the base, narrower at the middle, broadening again towards the tip; parameres approximately as long as the aedeagus, almost of the same width in their whole length, narrowing only at the tip. *Lengths* of four ♂♂ 6.2, 6.5, 6.5 and 6.5 mm. respectively; of four ♀♀ 6.0, 6.2, 6.2, 6.2 mm. Widths, 2.2, 2.2, 2.5, 2.3 mm. for the ♂♂; 2.0, 2.2, 2.3, 2.2 for the ♀♀.

Holotype ♂, and *allotype* ♀, from DUPARQUET, QUEBEC, CANADA, 27. V. 1940 and 26. IX. 1934, G. Stace Smith, collector; in the California Academy of Sciences. *Paratypes:* a pair from the type locality, 11, XI. 1934, under bark *Populus*, in Kalik collection; ♂, ♀ from Canada, in coll. Museum Prague; ♂, ♀, from Canada, in Kalik collection.

Compartive notes: Lepesme (1950:65) described *Dermestes*

lardarius, ab. *reductus* as follows: "Je donne le nom de reductus à des exemplaires de petite taille (moins de 6 mm.) à pubescence claire des élytres particulièrement blanche; je n'ai observé cette forme que d'Amérique du Nord." Notwithstanding the brief statements of the description I believe that my specimens are identical with the type which the author obtained from Mr. J. Mitchel and returned to him. At present the type is not accessible to me, and I therefore cannot fully confirm my opinion, but in any case I consider the specimens described by me as of specific status for the following reasons:

(a) According to G. Stace Smith and H. B. Leech, who have both collected living specimens, *D. reductus* is a species of wooded areas, away from human habitations. Of the Quebec examples, one was found on fresh lumber, one under the bark of *Abies* sp., and two under the bark of *Populus* sp. Typical *D. reductus* has also been collected in British Columbia at Creston, 18. X. 1931 (G. Stace Smith), Salmon Arm (under the bark of an old Douglas fir log—H.B.L.), and Vernon (Ralph Hopping). *D. lardarius* is a species predominantly bound to food and material worked by man.

(b) The range in size of the eight type specimens of *D. reductus*, as mentioned in the description, is 6 to 6.5 mm. In most examples of *D. lardarius* the size is 7 to 8.5 mm. The relation of the numbers of specimens of different sizes among the 89 *D. lardarius* at present at my disposal from different localities, is given in the graph (fig. 3). It is evident that a size of less than 7 mm. is quite exceptional and extreme (apparently starvation forms). In three specimens from North America the length is 8.0, 8.5, and 9.0 respectively.

(c) The whole beetle is black, even the elytra under the transverse band of gray hairs, whereas in *D. lardarius* this area is red to brown. The dark spot at the base of each elytron is not divided into two smaller spots by gray hairs, as it is in *D. lardarius*.

(d) The sides of the elytra are relatively more parallel, the lateral margins of the prothorax less raised, the body flatter, than in *D. lardarius*.

(e) The posterior margins of the abdominal segments are interruptedly gray and brown pubescent; in *D. lardarius* the whole segments are unicolored gray, brown or black.

(f) In *D. reductus* the aedeagus narrows in the middle (fig. 1), whereas in *D. lardarius* it is of almost equal width for its whole

length (fig. 2). I have not yet had a sufficient number of males of the the new species, and so have only been able to compare the shape of the aedeagus in two specimens. Thus it will be necessary to convince ourselves of the constancy of this feature by examining a greater number of males.

Fig. 1. Aedeagus of *Dermestes reductus* Kalik, new species. Fig. 2. Aedeagus of *Dermestes lardarius* Linnaeus.

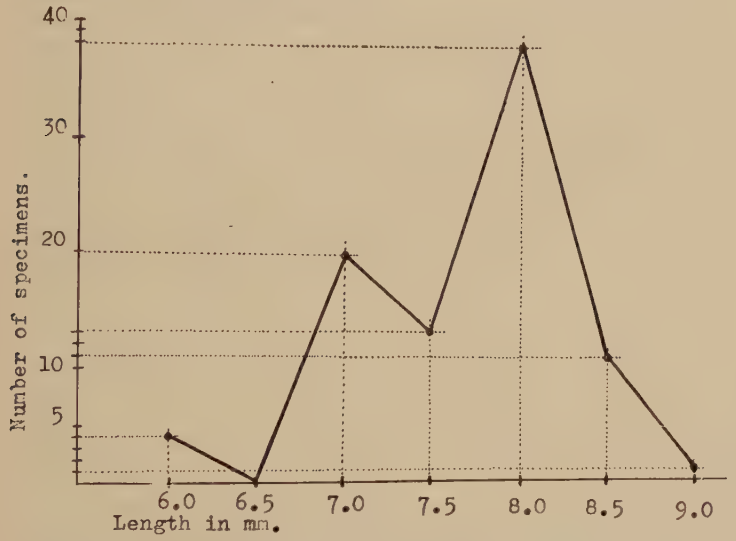


Fig. 3. Graph showing relation between sizes of specimens and number of specimens of *Dermestes lardarius* Linnaeus.

Dermestes leechi Kalik, new species

Form and color: Oblong, moderately convex, brownish-black. Eyes fairly large. Pronotum broadest in posterior third, strongly narrowing towards the anterior end, of semicircular shape in dorsal view, moderately narrowed basally, anterior angles invisible from above, posterior angles rounded. Scutellum cordate. Elytra subcylindrical, with sub-parallel sides which narrow only in the posterior quarter. Antennae of 11 segments, reddish-brown, club 3-segmented, inserted almost in the middle of the funicle; 8th segment short, transverse.

Punctation: Above rather coarsely punctured, punctures on disk of pronotum separated by approximately their own diameters. Abdomen more finely but fairly closely punctured. *Pubescence:* Upper surface covered uniformly

but not too densely with a short grayish-yellow pubescence, that of under surface similar but much denser. *Sexual characters:* Third and 4th abdominal segments of male each with one circular fovea with a brush of hairs. Aedeagus very short, slightly curved, of almost the same width throughout. Parameres about a fourth longer than the aedeagus, of equal width throughout, narrowing only at the apices which are bordered with yellow hairs. *Length* of ♂ and ♀: 7.5 to 8.0 mm.; width 2.2 to 2.5 mm.

Holotype ♂, and allotype ♀, from BHADRAVATI, TANJORE DISTRICT, southern INDIA, in collection of Museum Prague. *Paratypes*, all topotypical; ♂, 2 ♀ ♀, in collection of Museum Prague; 1 ♀ in the California Academy of Sciences, San Francisco; 2 ♂ ♂, 1 ♀ in Kalik collection.

Compartive notes: This species resembles by the uniformity of its pubescence *D. peruvianus* Castelnau and *D. nidum* Arrow. It is distinguished from the former mainly by the fact that it is smaller, that the male has a fovea on both the 4th and 5th abdominal sternites, that the pronotum is more convex, its anterior angles not flat and not visible from above. It is distinguished from *nidum* by the elytra being without trace of striae, by its smaller size, and by its more convex pronotum. I am pleased to name this species in honor of Mr. Hugh B. Leech of the California Academy of Sciences, San Francisco.

DERMESTES UNICOLOR Lepesme

In the material from the California Academy of Sciences I found six specimens of Dermestes from San Roque, Baja California, 2.8. 1922, which I regarded originally as a variety of *D. carnivorus* F. It is, however, possible that these specimens represent Lepesme's species *D. unicolor*, whose type in the Museum in Paris I had no opportunity to examine. Lepesme's description (1950:57) runs as follows:

"*D. unicolor* n. sp. Long.: 7-8 mm.—Très voisin du précédent [*carnivorus* F.], plus convexe. Brun noir, uniformément couvert à la face dorsale d'une pubescence blonde peu épaisse régulièrement couchée en arrière, aussi bien sur le pronotum que sur les èlytres. Face sternale garnie de pubescence blanche, exception faite seulement d'une tache triangulair à l'angle antéro-latéral des cinq sternites abdominaux apparents. Dispersion géographique.—Antilles (Muséum de Paris)."

The specimens, of which two are now in my collection, very much resemble *D. carnivorus*. Some have quite black elytra, others are slightly brown on the shoulders; the whole surface is uniformly grayish yellow pubescent, only the sides of the pronotum having

white hairs directed from the side inwards. This white pubescence of the sides of the pronotum does not, however, stand out strikingly from the general, light pubescence of the surface. The underside of the body has the pubescence as in *D. carnivorus*. The aedeagus of the male is very similar to that of *D. carnivorus*, which has perhaps a slightly narrower tip. According to my examples I believe that they represented a form of *D. carnivorus*. Only after a comparison with Lepesme's type I shall be able to confirm my opinion that the cited examples are actually identical with *D. unicolor*. To be sure that this species is only a form of *D. carnivorus*, I am in need of more material for comparison. Until that time I shall take Lepesme's identification as for that of an independent species.

Dermestes sobrinus Leconte

I have in my collection one female specimen of Dermestes from Cuba, which I regard as belonging to this species according to Reitter's remarks in 1879 (p. 28) "Diese Art ist dem *carnivorus* sehr nahe verwandt und ist an den ganz dunklen Seitenstücken der Hinterbrust leicht zu erkennen." This character is not mentioned at all in the original description by Leconte (1854: 108). Though the underside of my specimen is in part worn, I ascertained at the posterior margin of the sternites of the abdomen brown spots, which might correspond to the feature in the original description: "abdomine maculis nigris quadruplici serie ornato." The femora have small spots with white hairs. On the whole this species is very similar to *D. carnivorus* or *unicolor* Lepesme, uniformly grayish yellow pubescent on the upper surface, only the epipleurae and sides of the prothorax narrowly grayish white, on the shoulder a small spot of yellow hairs. The whole metasterna densely covered with brown pubescence.

Thaumaglossa rufomaculata Pic

I found five specimens of this beautiful and characteristically colored beetle in the material of the California Academy of Sciences: 1 female from Nanking, China, V. 3. 1923, and 4 ♀♀ from Alabang, Philippine Islands, Luzon Isl., XI. 9. 30. collection of E. C. Van Dyke. The British Museum has the type of *T. rufomaculata* Pic (described as an *Aethriostoma* in 1938: 12 from Kuala Lumpur) marked as conspecific with *T. laeta* Arrow, 1915: 435, whose type is also in the British Museum. I sent one of my specimens for comparison to London. Mrs. H. Cook kindly informed me

that all three specimens, both types and the example I had sent, seem to be completely identical except for the shape of the red spot on the discus of each elytron. According to Mrs. Cook's drawings the spot is round in *Thaumaglossa (Aethriostoma) rufomaculata* Pic, of irregular shape and probably on the anterior side with worn hairs as shown in the figure in *T. laeta* Arrow. In one of my specimens the spot is completely round, in the others partly irregular. This irregularity is due to the fact that the red pubescence covering the red spot on each elytron is worn in some specimens, and thus the light coloring of this spot is not clear at the margin and partly fuses with the dark neighborhood. Until I am able to reexamine the conspecifity of the two species with conclusive validity I retain for my specimens the designation *T. rufomaculata*, as according to the shape of the spot they are closer to this type. If the two species should prove conspecific. Arrow's name will be valid.

Matsumura & Yokoyama described (1928: 53-4) from Formosa *Orphilus bimaculatus*. As in the description they speak distinctly of the surface as being covered by pubescence, their species cannot be a representative of the genus *Orphilus* whose species are bare; according to the diagnosis: "Elytra with a large reddish circular spot on its back, closely punctured and furnished with black (in general part) and reddish hairs (on the spot)," it is most probably again *T. rufomaculata (laeta?)*. If the two suppositions on the conspecifity of the species mentioned should be confirmed, the synonymy would be as follows: 1915, *Thaumaglossa laeta* Arrow. 1928. *Orphilus bimaculatus* Matsumura & Yokoyama. 1938. *Aethriostoma rufomaculata* Pic.

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A NEW SPECIES OF *LORDOTUS* FROM SOUTHERN CALIFORNIA

(Bombyliidae: Diptera)

J. C. Hall
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During a five-week period of collecting in the San Gabriel Mountains of the Angeles National Forest, Los Angeles County, California, two species of the genus *Lordotus* Loew were collected. One of these was identified from the key to *Lordotus* by Painter[1] (1939) as *L. planus* O.S. The other appeared to be a new species, which ran to couplet three in Painter's key, and this assumption was verified by R. H. Painter, who kindly examined the specimens and compared them with the determined species of *Lordotus* in his collection.

The species was found in great abundance during the months of June and July. It frequented open areas, usually fire breaks, on the brush-covered ridges at elevations of 2,500 to 6,000 feet. The flies were caught resting on the ground and none were observed visiting the many species of flowering plants that were in abundance at that time.

Lordotus ermae Hall, new species[2]

Female—Integument black; wings hyaline, veins on basal one-fourth pale, apical three-fourths dark; costal cell and subcostal cell yellowish; first basal cell infuscated in some lights; haltere stalk yellow, knob white. Antenna with dark buff pile above, longer, paler below; face densely buff pilose, tomentum wanting; palpi with long yellow and short black pile intermixed; occiput pale buff pilose, thick white tomentose; thoracic dorsum with pale buff pile intermixed with white pile anteriorly, becoming shorter and scattered posteriorly, becoming long and thick towards base of scutellum, thick white tomentum overall, a patch of white pile above wing bases; dense white tomentum extends from wing base to humeral cross-vein; thoracic pleural area buff pilose; tomentum wanting, pteropleuron bare; coxae with long buff pile; femur dark yellow pilose and tomentose; squama buff pilose; abdominal

[1]Painter, R.H., 1939. Notes on type specimens and descriptions of new North American Bombyliidae. Trans. Kansas Acad. Sci. 42:267-301.

[2]A modern patronymic dedicated to my wife.

dorsum buff pilose; basal one-half of pile yellowish, apical one-half white giving a buff color to pile, a stripe of white tomentum extends from segment II to segment IV on a median dorsal line; pygidium with short yellow pile, scattered white tomentum; abdominal venter darker buff pilose, tomentum wanting. Length of first antennal segment 0.45 mm.; second 0.20 mm.; third 1.0 mm.; face slightly protruding below and above oral opening; proboscis nearly twice as long as anterior tibia; middle tibia with a strong apical spur; costa not denticulate. Length of body 10-12 mm.

Male—Similar to female but differing in the following: Pleural area ground color lighter. Antennal pile partly black towards apices of segments I and II; femora without dense tomentum; abdominal pile white, tomentum wanting; body pile in general lighter. Genitalia apparently identical to those of congeners; length of body 10-13 mm.

Holotype, female and allotype male (Cal. Acad. Sci.), TANBARK FLAT, LOS ANGELES COUNTY, CALIFORNIA, June 20, 1950 (J. C. Hall). *Paratypes*—(all from Los Angeles County, California), 35 males, 25 females, Tanbark Flat, June 19-July 4, 1950 (J. C. Hall, R. Schuster, D. C. Blodget, C. J. Weinmann, A. T. McClay, W. O. Marshall, H. F. Robinson, W. A. McDonald, P. D. Hurd, J. W. MacSwain, T. R. Haig, F. X. Williams, individual collectors of specimens). 1 male, Camp Baldy, June 26, 1950 (K. G. Whitesell). 1 female, Johnstone Point, July 14, 1950 (R. Schuster). 1 female, Crystal Lake, June 29, 1950 (H. F. Robinson). 1 male, Big Dalton Dam, June, 1950 (F. X. Williams).

Paratypes are in the collections of the following: California Academy of Sciences, California Insect Survey, University of California at Berkeley, University of California at Davis, U. S. National Museum, R. H. Painter (Kansas State College), F. R. Cole, and the writer.

Variations—Male and female—pleural area ground color black to gray. Antennal pile yellow to black above, yellow to dirty white below; abdominal pile buff to pale yellow to dirty white to brown depending upon the light used; stripe of white tomentum sometimes scattered but always present in the female, wanting in the male.

L. ermae appears to be more closely related to *planus* Coquillett, *miscellus* Coquillett, and *junceus* Coquillett than to *gibbus gibbus* Loew. It differs from *planus* in the absence of infuscations on the wings, and the black legs; from *misellus* in the absence of denticulations of the wings, and the broad dark pilose dorsal band on the abdomen; and from *junceus* in the absence of black or brown pile on the abdomen, and minute black points on the front. It is also several times larger than any of the above three. The male genitalia are similar in all of the above.

THE GENUS EURYSA IN AMERICA NORTH OF MEXICO

(Homoptera: Fulgoridae, Delphacinae)

R. H. BEAMER*

University of Kansas, Lawrence

I am following Muir and Giffard in the placing of these species in *Eurysa*. They could possibly belong to the European genus *Eurybregma* but at the present time it seems best to consider them in *Eurysa*.

EURYSA Fieber

EURYSA Fieber, Verb. Zool. Bot. Ges. Wien, XVI (1866), p. 520, genotype *lineata* (Perr.).

This genus is characterized by the wider than long crown almost devoid of carinae and the front widest at base without carinae on basal third.

KEY TO SPECIES

1. Male styles with finger-like projection on inner apical margin ..... *kormusi* (Crawf.)
   Male style without such a projection 2
2. Pygofer in lateral view with angular foot-like process on ventro-caudal margin ..... *magnifrons* (Crawf.)
   Pygofer without such a process 3
3. Anal segment with processes extending straight out from segment ..... *obesa* Beamer
   Anal segment with processes curved ..... *montana* Beamer

EURYSA KORMUSI (Crawford)

MEGAMELUS KORMUSI Crawford, C. L., A Contribution Toward a Monograph of the Homopterous Insects of the Family Delphacidae of North and South America, 1914, p. 614.

Brachypterous form: Easily separated from the other species of this genus by the finger-like process on the inner margins of the apices of the styles. Length ♂ 3.0 mm., ♀ 3.75 mm.

Structure: Front not quite twice as long as wide, widest on basal third, very slightly narrowed toward base, more so toward apex, definitely tricarinate on apical two-thirds; crown as wide as median length, apex rounded without carinae, carinae more or less visible on base; elytra longer than wide, hyaline, veins raised, apices truncate with rounded corners.

Color: General color stramineous more or less suffused with fuscous; dorsum of abdomen with darker stripe on lateral margins.

Genitalia: Pygofer in lateral view more or less rectangular with posterior margin extended posteriorly over about one-third distance in large triangle; anal segment with a pair of very broad ventrally curving processes; aedeagus wide at base, narrowed to long parallel-sided shaft, slightly bent dorsally, apex surrounded by about eight sharp teeth, three additional teeth just

*Contribution from the Department of Entomology, University of Kansas.

beyond middle of ventral margin; styles not visible in this view. In caudal view styles widest on basal half, diverging, inner margin narrowing to about half median width on outer fifth, a finger-like projection on inner margin of apices.

Described originally from a brachypterous pair from Ormsby County, Nevada (Baker).

Types deposited by Crawford in the collection of Pomona College, Pomona, California.

Redescribed from ♂ and 4♀♀, Sears Point, Marin County, California, May 18, 1931, E. P. Van Duzee.

EURYSA MAGNIFRONS (Crawford)

MEGAMELUS MAGNIFRONS Crawford, C. L., A Contribution Toward a Monograph of the Homopterous Insects of the Family Delphacidae of North and South America, 1914, p. 614.

Brachypterous form. Structure: Front not quite twice as long as basal width, widest just basad of middle, slightly narrowed toward base, more so toward apex, definitely tricarinate except at base crown distinctly wider than long, carinae indefinite on apex, more distinct basally; elytra longer than wide, veins raised, apices rounded.

Color: General color stramineous to almost brown, carinae of pronotum, scutellum and abdomen and pustules of abdomen light.

Genitalia: In lateral view pygofer of male much wider on ventral margin with an angular foot-like projection at ventral caudal corner; anal segment with caudal side extended into a pair of broad, very long curving processes; aedeagus long, slightly curved ventrally, with apex enlarged to twice diameter of shaft with one recurved, short hook on dorsal margin and ventral margin from apex to more than middle of shaft with about 15 retrorse teeth; styles not visible in this view. In caudal view, styles widest at base, diverging, outer margins sinuate and narrowing to avicephaliform apices; aedeagal brace wide, very slightly produced.

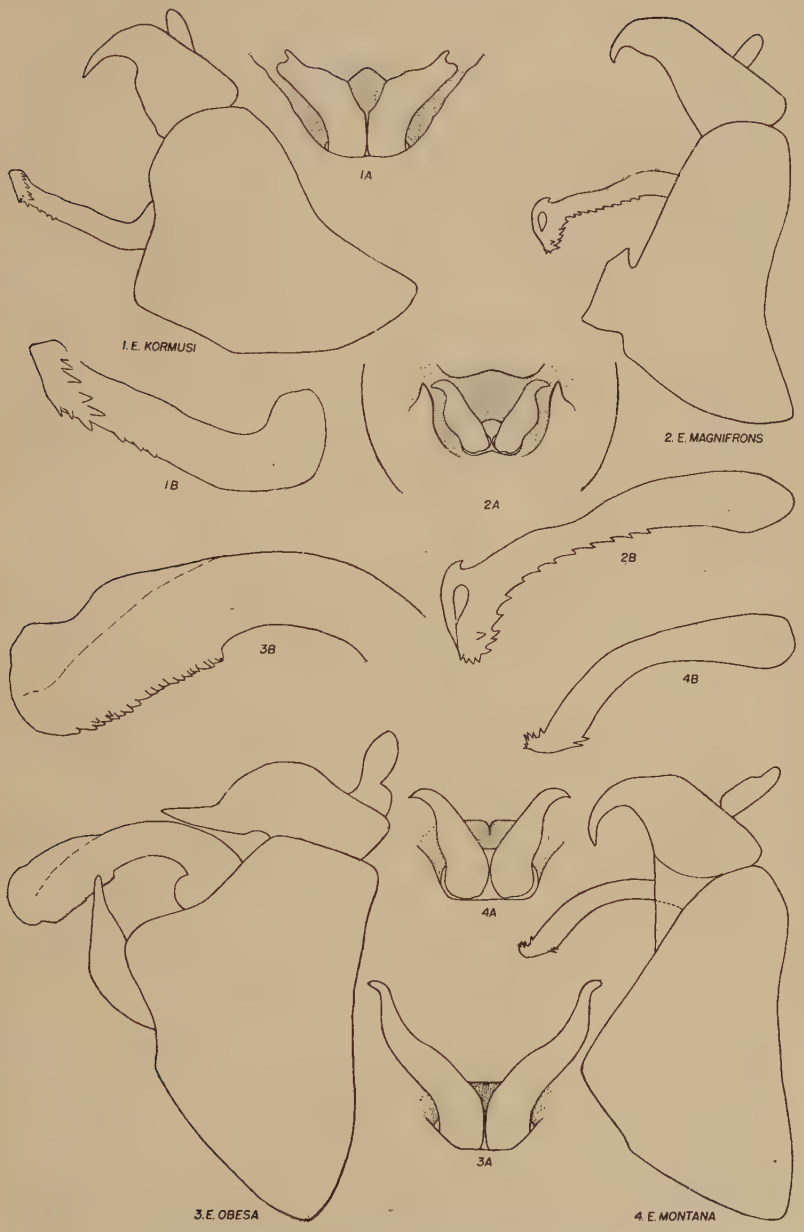
Redescribed from 3 ♂ ♂ and 4 ♀ ♀, Florissant, Colorado, July 6, 1949, R. H. Beamer; ♂ ♀, Garrison, Montana, July 10, 1933; ♂, Merritt, British Columbia, Canada, August 3, 1931; 3 ♂ ♂ and 3 ♀ ♀, Yellowstone National Park, July 12, 1939, D. J. and J. N. Knull. Crawford's male holotype is Cat. No. 15986, U. S. National Museum.

Macropterous form: Like the brachypterous form except with long flight wings and generally darker in color. Elytra fumous throughout and darker still from cross-veins to apices.

Holomorphotype ♀, Florissant, Colorado, July 6, 1949, R. H. Beamer! in Snow Entomological Collections, University of Kansas.

Eurysa obesa Beamer, new species

Brachypterous form: Resembling *Eurysa kormusi* but elytra



Figs. 1-4. Genitalia of some species of *Eurysa*. Figs. 1, 1A, 1B, *E. kormusi*. Figs. 2, 2A, 2B, *E. magnifrons*. Figs. 3, 3A, 3B, *E. obesa*. Figs. 4, 4A, 4B, *E. montana*.

about as wide as long instead of longer than wide, and male styles in caudal view widest at base and narrowed to apices. Length ♂ 3.5 mm., ♀ 4 mm.

Structure: First segment of antennae longer than wide; front slightly longer than broad, widest at base, definitely tricarinate on apical two-thirds; head wider than thorax; crown wider than long, apex rounded, carinae indistinct; elytra about as wide as long, semihyaline, apices almost truncate, veins raised, abdomen often with raised median longitudinal ridge and rows of pustules along sides.

Color: General color stramineous, body often more or less mottled with brown, some specimens with broad fumose line either side of middle of dorsum.

Genitalia: In lateral view, pygofer almost triangular, narrowest at ventral corner; anal segment with pair of heavy processes extending away from segment at caudo-ventral corner; aedeagus heavy, curved ventrally in almost half circle, widened on outer third, ventral margin more or less serrate in this region; styles widest at base, gradually narrowed to sharp apices. In caudal view, aedeagal brace broad and even, not raised or excavated; styles widest at base, sinuate, gradually narrowed to diverging apices.

Holotype ♂, *allotype* ♀ *and 2* ♂ *paratypes*, LARAMIE, WYOMING, 40 miles N.E., July 13, 1937, R. H. Beamer; other *paratypes:* 2 ♂ ♂ and ♀ North Powder, Oregon, July 13, 1931, R. H. Beamer; 11 ♂ ♂ and 13 ♀ ♀, Yellowstone National Park, Wyoming, July 12, 1939, D. J. and J. N. Knull.

Macropterous form: Like the brachypterous form except slightly darker and with flight wings extended much beyond the body.

Holomorphotype ♂, Barclay, Utah, July 2, 1931, R. H. Beamer; ♂ *paramorphotype*, Deeth, Nevada, July 21, 1945, R. H. Beamer; *allmorphotype* ♀; 2 ♂ ♂ and 6 ♀ ♀ *paramorphotypes*, Yellowstone National Park, Wyoming, July 12, 1939, D. J. and J. N. Knull. Types in Snow Entomological Collections and collections of Ohio State University.

Eurysa montana Beamer, new species

Brachypterous form: Resembling *Eurysa obesa* but sides of dorsum of abdomen with a more definite black longitudinal vittae, aedeagus of male not swollen on outer third and anal processes curved ventrally. Length ♂ 3 mm., ♀ 3.5 mm.

Structure: First segment of antennae slightly longer than width; front widest at base, length to width is as 5 3/4 is to 3 1/2, strongly tricarinate on apical two-thirds; crown broad, much wider than median length, carinae absent except basally in some specimens; elytra definitely longer than wide, veins raised, apices broadly rounded; dorsum of abdomen with segments keeled on median line and with pustules on lateral margins.

Color: General color stramineous, sometimes fumous; dorsum of abdomen usually with a more or less definite fumous longitudinal strip on side of middle.

Genitalia: In lateral view, pygofer almost triangular with dorsal margin narrowest; anal segment with a pair of ventrally curved processes arising on ventro-caudal margin; aedeagus long with sides almost parallel, gently curved ventrally with apex slightly recurved and with several short sharp teeth on both margins; styles not visible from this view. In caudal view styles widest at base, diverging, narrowed evenly from bases to out-curving apices, outer margin sinuate; aedeagal brace with slight excavation and caudally projecting trough.

Holotype ♂, *allotype* ♀, 6 ♂ and 4 ♀ *paratypes*, LARAMIE, WYOMING, August 5, 1949, R. H. Beamer; other paratypes, 14 ♂ ♂ and 5 ♀ ♀, same place and date, J. R. White.

Macropterous form: Like the brachypterous form except with flight wings. *Holomorphotype* ♂, Laramie, Wyo., August 8, 1949, J. R. White; *allomorphotype* ♀, same place and date, R. H. Beamer. Types in the Snow Entomological Collections.

A NEW GENUS OF CHRYXINAE FROM BRAZIL AND ARGENTINA

(Hemiptera: Reduviidae)

ROBERT L. USINGER
University of California, Berkeley

The subfamily Chryxinae was proposed by Champion (1898) for *Chryxus tomentosus*, a new genus and species described by him from two specimens collected in Panama. A third specimen has since been collected in British Guiana (British Museum).

A second species, *Chryxus travassosi* Lent and Wygodzinsky (1944) was described from Brazil. Then, in 1946, a new genus and species, *Lentia corcovadensis* Wygodzinsky, was described from Brazil and the position of the subfamily was reviewed. This completes the published history of this small but interesting group.

The present note is prompted by the discovery in the Paris Museum of a second female specimen of *Chryxus travassosi* Lent and Wygodzinsky*. This specimen is from Misiones, Argentina, Env. de San Ignacio, Villa Lutecia, E. R. Wagner, 1910. It agrees perfectly with the description and figures given by Lent and Wygodzinsky except that the fourth antennal segment is longer than

*Dr. Wygodzinsky writes (March 26, 1951) that a male specimen was collected by O. Schubart on May 19, 1950, Estacao Experimental, Pirassununga, Sao Paulo, Brazil, in house (Wygodzinsky Collection).

the third, the ratio of the two segments being 25:21. Since all other characters are identical it is suggested that perhaps the apex of the fourth antennal segment was broken off in the type.

Although *Chryxus tomentosus* and *travassosi* are obviously related, a comparison of the two (British Museum, 1948) revealed certain striking differences which would warrant generic separation elsewhere in the Reduviidae. Accordingly, *Chryxus travassosi* Lent and Wygodzinsky (1944) is here designated as the type species of the new genus **Wygodzinskyella.** The characters of the type are given in great detail by Lent and Wygodzinsky (1944). *Chryxus* Champion differs in that the scutellar spine is thickened apically (flattened in *Wygodzinskyella*), the corial veins are distinct on the basal half of the transparent corium (practically indistinguishable on the opaque corium in *Wygodzinskyella*), the connexivum is alternated and the legs entirely pale (connexium uniformly pale, femora broadly black at middle, tibiae black except at basal fourth and tarsi black in *Wygodzinskyella*), and the size smaller (about half as long as *Wygodzinskyella*).

It is a pleasure to dedicate this distinctive genus to Dr. Peter Wygodzinsky, whose outstanding work has contributed so much to our knowledge of the Hemiptera of the Neotropical Region.

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ANOTHER AMERICAN FLY ATTRACTED TO SMOKE

(Diptera: Empididae)

Edward L. Kessel
University of San Francisco

In a paper published a few years ago (Wasmann Collector, 7:23-30. 1947), the writer reported his observations on the American smoke flies belonging to the genus *Microsania* of the family Clythiidae. On August 20, 1946, hundreds of these small dipterans were attracted to the smoke of an outdoor fireplace at the owner's home in Mill Valley, Marin County, California. On that same

occasion numerous individuals of a fly species whose members are about twice the size of the microsanias were seen flitting about on the leaves of a California laurel bush which was in the direct path of the smoke. They mingled with the microsanias and were the only other insects which seemed to be attracted by the smoke. A specimen of this second species, which proved to be an empidid, was sent to A. L. Melander, who kindly identified it as *Hormopeza brevicornis* Loew. In his letter Dr. Melander says, "I have taken specimens of *Hormopeza* in the house where they gather on the window panes when they attempt to leave. I have also taken them on the walls of my tent when camping. *Microsania* gathers on the tent fabric also. Maybe these insects were attracted in the first place by smoke."

Inasmuch as empidids are notorious as predators on other insects, particularly flies, it was supposed that the hormopezas were present to prey on the microsanias. However, none was seen to attack any member of the smaller species. Because the writer's interest on that occasion was concerned primarily with *Microsania*, no mention was made of *Hormopeza* in the report. It was hoped that subsequent observations would be made with emphasis on *H. brevicornis*, but a change of residence on the part of the writer has interfered with this plan. Therefore these notes are published without further delay.

This seems to be the first American species of *Hormopeza* which has been observed to possess a positive tropism toward smoke. Nevertheless, Sharp (Ent. Monthly Mag., 54: 244. 1918) has reported a small dipteran sharing the hot and smoke-permeated atmosphere of a forest-fire area in England with the buprestid beetle, *Melanophila acuminata* De G. This fly was identified later by Mr. J. E. Collin as *Hormopeza obliterata* Zett. It seems probable, therefore, that the species of *Hormopeza*, like those of the genus *Microsania*, are irresistably attracted to smoke. What benefit, if any, they receive from this response remains to be demonstrated. Likewise the particular attractant in the smoke remains to be identified. Several writers, including Champion (Ent. Monthly Mag., 54: 199-200, 1918), Van Dyke (Pan-Pac. Ent., 3: 41. 1926), and Linsley (Jour. Econ. Ent., 36; 341. 1943) have added to the observations on species of *Melanophila* being attracted to smoke. Brues (Psyche, 57: 114-115. 1951) has reported that the vespid, *Eumenes curvata* Sauss., is also attracted to smoke. It would be

interesting to know if the positive fumotropic responses of the flies, beetles, and wasps mentioned above are initiated by the same constituent of the smoke.

TRIATOMA PROTRACTA INFECTED WITH TRYPANOSOMA CRUZI AT RIVERSIDE, CALIFORNIA (Hemiptera: Reduviidae)

On November 27, 1950, *Triatoma protracta* (Uhler) was collected between Arlington and Lake Mathews in a canyon 3 miles south of Arlington and 5 miles south of Riverside, California.

This is the first record of *Triatoma protracta* from this locality and moreover, infected *Triatoma* have not been reported previously from the vicinity of Riverside, California. A total of fifteen nymphs and three adults were taken from three nests of wood rats, *Neotoma fuscipes macrotis* Thomas. On examination of feces and gut contents two fifth instar and two fourth instar nymphs were found to be infected with flagellates. Stained slides of this material showed organisms morphologically identical with *Trypanosoma cruzi* Chagas.

A survey is being conducted to determine the incidence of infection in the vertebrate and invertebrate hosts of *T. cruzi* in the canyon mentioned above. Infected *Triatoma* have been previously reported from San Diego Co. by Kofoid and Donat, 1933[1]; Fallbrook, San Diego Co. by Wood, 1944[2]; and Eaton Canyon, Pasadena, Calif., by Wood 1938[3]—RAYMOND E. RYCKMAN

REINHARDIANA NEW NAME FOR HYPENOMYIA TOWNSEND (DIPTERA: TACHINIDAE OR LARVAEVORIDAE)

A genus *Hypenomyia* (type *petiolata* Townsend) was proposed by C. H. T. Townsend in 1919 in *Proceedings of the United States National Museum*, Volume 56, page 545; it is considered a valid genus. However, P. H. Grimshaw proposed the same name in 1901 in *Fauna Hawaiiensis: Diptera*, Volume III, Part 1, page 53.

The new name **Reinhardiana** is here proposed for *Hypenomyia* Townsend, 1919, *nec Hypenomyia* Grimshaw, 1901, in recognition of Professor H. J. Reinhard's many contributions on the American Muscoidea.—PAUL H. ARNAUD.

[1]Calif. West. Med. 38:245-249.
[2]Jour. Parasitology, 30(3):199.
[3]Science, 87 (2260) :366-367.

Book Notice

The Sucking Lice, by G. F. Ferris, with collaboration of Chester J. Stojanovich. Volume I of the Memoirs of the Pacific Coast Entomological Society, California Academy of Sciences, San Francisco, ix + 320 pages (Photo offset). 1951. $6.00.

The importance of the sucking lice as ectoparasites of mammals and as vectors of agents of disease is well recognized but it has remained for Dr. Ferris to present in a practical, readily usable form the pertinent information on the systematics of the group.

The 124 excellent figures do much to clarify the text, not only serving as aids in identification of sucking lice but also in understanding the morphology of lice, particularly of the mouthparts.

A short section is devoted to a consideration of the ectoparasites of birds and mammals, followed by a detailed chapter on the morphology and anatomy of the Anoplura. The structure of the head and mouthparts is given special attention. There is a short chapter on growth and development including descriptions with figures of eggs and other immature stages of Anoplura. A historical review of the taxonomic status of the sucking lice is given with the characteristics of the order described. Ordinal separation of sucking lice from biting lice is argued primarily on the basis of profound differences in morphology of the mouthparts, minimizing claims for relationship made on the basis of similarities in the tracheal system of the two groups, or on similarities of habit.

The classification within the order is outlined in a short section giving the author's reasons for adapting the system employed. Here again Ferris has emphasized the morphological basis for establishment of family and subfamily boundaries. He recognizes that his opinions will find criticism, as for example in alying the genus *Pedicinus* with the group established as the family Hoplopleuridae rather than in the family Pediculidae as is the usual practice. The most extensive chapter of the book is a review of the families, subfamilies, genera and species of the Anoplura. This is replete with keys down to the species level. Commonly encountered or otherwise important species are well illustrated. A mammalian host list adds to the usefulness of the text. The final chapter deals with the distribution of the Anoplura, delving into hypotheses and speculations on the probable phylogeny of various groups of sucking lice in relation to host phylogeny. The book is a "must" to all who are interested in ectoparasites of mammals.—Deane P. Furman.

PACIFIC COAST ENTOMOLOGICAL SOCIETY

E. O. Essig
Vice-President

R. L. Usinger
President

D. D. Jensen
Secretary

Proceedings

Two Hundred and Fifteenth Meeting

The two hundred and fifteenth meeting of the Pacific Coast Entomological Society was held at 7:30 p.m. on February 16, 1951, in the entomological laboratories of the California Academy of Sciences, San Francisco. President Usinger conducted the meeting. The following members were present: W. C. Day, E. O. Essig, E. C. Van Dyke, R. F. Smith, O. E. Bryan, Otto W. Graf, S. G. Watkins, P. H. Arnaud, J. Figg-Hoblyn, Lynne Scott, Laura M. Henry, G. F. Ferris, J. Gordon Edwards, William Hazeltine, D. P. Furman, W. W. Middlekauff, R. L. Doutt, J. E. Gillaspy, E. A. Smith, Theodore Aarons, W. C. Bentinck, C. A. Downing, P. A. Adams, C. Don MacNeill, T. F. Leigh, F. X. Williams, W. W. Sampson, J. N. Simons, W. H. Wade, E. R. Kessel, Berta B. Kessel, L. R. Gillogly, H. B. Leech, G. A. Marsh, J. W. Green, V. M. Stern, K. F. Innes, Jr., R. W. L. Potts, G. F. Carter, J. W. MacSwain, Norman Lewis, R. L. Usinger and E. G. Linsley. The following visitors attended: Helen L. Day, W. W. Allen, Mrs. W. W. Allen, Mrs. D. E. Bryan, Anne Minaker, Kenneth Beck, C. E. Bodwell, Mrs. R. L. Doutt, Mrs. J. E. Gillaspy, Heidi Aarons, Janice Downing, Allan D. Telford, H. R. MacCarty, Tom Lauret, Elsie Sampson, Barbara Stern, Mrs. Lorin Gillogly, Peter D. Ashlock, and Robert G. Krueger.

The minutes of the meeting held December 9, 1950, were read and approved.

The following were elected to membership in the Society: John Figg-Hoblyn, Benjamin Keh, Thomas H. Lauret, Norman A. Lewis. Edythe B. Braff, and William E. McMillan.

The proposed amendments to the By-Laws of the Society, which were mimeographed and circulated at an earlier meeting, were placed into effect by a unanimous vote of the membership present. The previous wording and the amended wording are given below:

AMENDMENTS TO THE BY-LAWS OF THE PACIFIC COAST ENTOMOLOGICAL SOCIETY

Previous wording	Amended wording
Article II, Section 3: The members of the Executive Board shall consist of the chairman of standing committees, the officers of the Society, and the editor of the Pan-Pacific Entomologist	The members of the Executive Board shall consist of the chairmen of standing committees, the officers of the Society, and the editor (*or one* of the editors) of the Pan-Pacific Entomologist . . . .
Article III, Section 2: At the regular fall meeting in the early part of September, a nominating committee of three members shall be appointed	At the *last regular meeting prior to the annual meeting*, a nominating committee of three members shall be appointed . . . .

Article V, Section 1: The Publication Committee, Program Committee, Historical Committee, and Membership Committee shall be known as standing committees, members to be appointed by the president when vacancies occur. Chairman shall be elected by the members of each committee from its own membership.	The Publication Committee, Program Committee, Historical Committee, and Membership Committee shall be known as standing committees. *Unless otherwise specified in the By-Laws the membership of these committees shall be reviewed by the president every five years, at which time he is authorized to recommend to the Executive Board such changes as may be deemed necessary. Committee vacancies occurring in the intervening period may be filled by presidential appointment, subject to confirmation by the Executive Board at its next regular meeting.*
Article V, Section 2, paragraph 2: The Publication Committee shall appoint an editorial board for the Pan-Pacific Entomologist consisting of an editor, assistant editor, two members of the Publication Committee to act in an advisory capacity to the editor, and such additional members as are deemed necessary.	The Publication Committee shall appoint an editorial board for the Pan-Pacific Entomologist consisting of an editor *(or editors) and such associate and assistant editors and advisory members as may be deemed necessary.*
Article VI, Section 8; All members, except for student members or as herein otherwise provided shall receive the publications of the Society with no additional charge.	All members, except for student members or as herein otherwise provided shall receive the *regular* publications of the Society with no additional charge.
Article VII. Section 1: At least four regular meetings shall be held each year, preferably *on the first Saturday of September, December and March* with an annual Field Day during April or May.	Delete: "on the first Saturday of" Add: "with two in the fall and two in the spring."

Dr. Hurd reported that beginning with the January, 1951, issue, the Pan-Pacific Entomologist would be printed on super-coated paper which would permit the reproduction of halftone illustrations. The changed format of the front cover was also mentioned.

President Usinger appointed a committee composed of Dr. Pritchard, Dr. Laura Henry and Dr. Edwards to arrange for the annual field meeting of the Society.

The President then called for notes and exhibits. Mr. Adams displayed specimens of *Balmes terissinus* Navas, collected in Yunnan Province, China. This species belongs to the very rare neuropteroid family Psycopsidae which is known from Australia, Asia and East Africa.

Dr. Doutt discussed an interesting parasite of the citrus mealy bug which Harold Compere had sent from Kenya Colony in Africa in 1947. This species, *Tropidophryne melvillei*, is normally thelyotokous, producing mainly females generation after generation and only occasionally bearing males. Many of the males become intersexes, starting genetically as males and gradually changing toward females. This parasite also exhibits the rare phenomenon of autonar-

cosis. If a large number of them are placed together in a vial they give off a volatile substance which anesthetizes them. Later they recover and thereafter they never again produce the substance.

Mr. Gillaspy reported that positive phototropism is a response of the immature stages of insects as well as of the adults. Both at Clear Lake, Lake County, and at ponds in eastern Santa Clara County, immatures, along with numerous adults, were attracted to Coleman lanterns placed in shallow water or over the surface of the water. Specimens were collected by means of a strainer as they swam close to the light. Immature forms of Ephemerida, Odonata, Chironomidae, Coleoptera, and various Hemiptera were collected in this manner. This may offer a convenient and previously unexploited means of obtaining material.

Dr. Ray F. Smith, of the University of California, was introduced as the main speaker of the meeting. His talk, entitled "Entomological Observations in Mexico," was illustrated with many colored pictures. A summary of his remarks is given below.

Dr. Smith reviewed his recent trip to Mexico to study the ecology of *Diabrotica* and related genera. He travelled over 17,000 miles in Mexico in the company of his family. *Diabrotica* are far more abundant and the species far more widespread in northern Mexico than previous records indicate. The thousands of beetles collected by this expedition enlarge the range of nearly every species known north of Mexico City. The Cucurbitaceae have long been considered as the primary hosts of *Diabrotica*. It is now apparent that there are several distinct food preferences in the group. A few are apparently restricted to cucurbits, but the major portion of the genus is associated with perennial grasses and a few others are confined to mints.

Following a discussion of Dr. Smith's talk, the meeting was adjourned.—D. D. Jensen, *Secretary*.

Two Hundred and Sixteenth Meeting

The two hundred and sixteenth meeting of the Pacific Coast Entomological Society was held at 2:00 p.m. on March 17, 1951, in the entomological laboratories of the California Academy of Sciences, San Francisco. President Usinger conducted the meeting. The following members were present: Gordon G. Marsh, F. X. Williams, J. W. Green, S. G .Watkins, P. H. Arnaud, Lynne Scott, E. O. Essig, W. C. Bentinck, Alexander Hubert, Otto W. Graf, Jr., E. G. Linsley, R. F. Smith, C. Don MacNeill, L. R. Gillogly, P. D. Hurd, Jr., T. W. Cook, W. C. Day, E. C. Van Dyke, R. L. Usinger, J. W. MacSwain, H. B. Leech, and J. Gordon Edwards. Visitors were present as follows: J. Robert McClintic, H. H. Meyer, J. W. Chapman, Marie Essig, Lucy Castro, Grace MacNeill, and Mary Cook.

The membership committee proposed and the Society elected Elwood S. McClusky as a new member.

Dr. Edwards reported that Alum Rock Park had been selected as the site for the annual field meeting of the Society which will be held April 22, 1951.

In response to the President's request for notes and exhibits, Dr. Van Dyke displayed a box of Coleoptera from the Michelbacher-Ross expedition to South America.

Dr. Edwards exhibited a long series of *Scolytus multistriatus* collected at San Jose. This species is known to carry the fungus causing the destructive Dutch Elm disease. Dr. Chapman stated that he had first reported the collection of this species in North America in Psyche in 1910.

The president then introduced as the main speaker of the day Dr. James W. Chapman, Chairman of Science Faculty, Emeritus, Silliman University, Duamguete, Oriental Negros, Philippine Islands, who presented three films dealing with Philippine insects. The films had been taken by Mrs. Bierne Brues, on Negros Island.

Dr. Chapman stated that he had made a study of the army ants of the genus *Aenichtus* which have numerous beetles, flies, cockroaches and Collembola associated with them in nature. However, it had been impossible to photograph them in their native jungle habitat.

Pictures were shown of several genera of Philippine ants illustrating their activities and their nesting habits. Nests were shown in twigs, among leaves, in stumps, etc. Of great interest were the pictures showing the manner in which adults of the leaf-nesting species use their larvae to tie leaves together by means of the larval silk.

The second film depicted mound-building termites whose mounds were built of excreta. These termites prepare a compost from undigested wood which is worked into a comb-like structure in which the fungus mushroom gardens are maintained. The termites keep the fungus cut back. When the same fungus grows outside of the colony it matures into edible mushrooms about 2 inches in diameter.

A third film presented pictures of a variety of miscellaneous insects such as bees, wasps, Lepidoptera, and spiders, millipedes, and scorpions.

After some discussion following the films the meeting was adjourned.—J. W. MacSwain, *Secretary pro tem.*

Two Hundred and Seventeenth Meeting
Alum Rock Park, April 22, 1951

The two hundred and seventeenth meeting of the Pacific Coast Entomological Society was held as the annual field meeting at Alum Rock Park, Santa Clara County, California, April 22, 1951.

The recorded attendance of 31 persons included 12 members and 19 visitors. Members were present as follows: Otto W. Graf, Jr., J. Gordon Edwards, J. W. Tilden, A. E. Pritchard, R. L. Usinger, P. H. Arnaud, W. W. Middlekauff, D. P. Furman, J. W. Green, E. G. Linsley, J. W. MacSwain, and P. D. Hurd, Jr. The following visitors were present: Anne Minaker, Hazel Tilden, Alice Edwards, Martha Usinger, Juanita Linsley, Jane MacSwain, Sherill Hurd, Phyllis Middlekauff, Marian Sylvester, E. S. Sylvester, E. C. Broadwell, Donald Dye, Marquerite E. Arnaud, Kay Furman, Joan Linsley, Alyce Vilberme, Ruth Green, Mrs. J. W. Green, and Robert Hendrickson.

The weather was very good and the field day was enjoyed by all members and visitors in attendance.—J. W. MacSwain, *Secretary pro tem.*

Two Hundred and Eighteenth Meeting

The two hundred and eighteenth meeting of the Pacific Coast Entomological Society was held at 7:30 p.m. on May 18, 1951 in the entomological laboratories of the California Academy of Sciences, San Francisco, President Usinger in the chair. The following members were present: Edgar A. Smith, J. G. Edwards, E. O. Essig, A. E. Michelbacher, C. P. Hoyt, J. P. Harville, W. C. Bentinck, E. L. Kessel, K. F. Innes, Jr., J. H. Freitag, E. C. Van Dyke, W. W. Middlekauff, H. B. Leech, J. W. Green, L. R. Gillogly, P. A. Harvey, E. G. Linsley, R. L. Potts, D. D. Jensen, G. A. Marsh, and R. L. Usinger. Visitors were present as follows: Donald J. Burdick, A. L. Johnston, Alice Edwards, H. H. Meyer, Mrs. L. R. Gillogly, James M. Linsley, Juanita M. Linsley and Joan Linsley.

The minutes of the meetings held February 16, March 17 and the field meeting held April 22 were read and approved.

The following were elected to membership in the Society: Joe Diaz, W. Lutz, Richard B. Selander, George F. Edmunds, and John Helfer.

Dr. Edwards exhibited the 14 drawings submitted in the contest sponsored by the Society for an appropriate seal for the Society. After the entries had been examined by the members present a vote by secret ballot was taken and the drawing submitted by Mrs. L. R. Gillogly, of Sacramento, received the majority of votes and was declared the winner. A complete set of the Pan-Pacific Entomologist was awarded to Mrs. Gillogly as the prize.

President Usinger reported that the historical account of the Society during its first fifty years had been completed and was ready for publication.

President Usinger reported that the date for the semi-centennial meeting of the Society had been tentatively scheduled for Saturday, September 29, 1951 at 2:00 p.m. A formal meeting will be held in the new auditorium of the Academy. This will be followed by "open house" in the entomological laboratories where historical material of the Society will be exhibited and refreshments will be served.

The President appointed the historical committee to arrange for the exhibits. A special committee was appointed to handle arrangements and refreshments at the Academy consisting of the following: Dr. and Mrs. E. L. Kessel, co-chairmen; Mr. Gustafson, Mr. Leech, Dr. Ross, Dr. Harvey and Mr. Green.

President Usinger reported that a gavel, made out of well-seasoned California Laurel, *Umbellularia californica*, had been made by Mr. John Simons and would be presented at the September meeting.

President Usinger reported that the Society's first memoire, "The Sucking Lice" has been edited and is being varityped for publication.

The question was raised as to whether the memoires should be provided free on the Society's exchange list and after some discussion it was decided they should not be free. It was also decided that a booksellers' discount of 15% would be given to commercial book dealers.

A motion was made by Mr. Potts and passed by the members present that Dr. Norman Frazier and Mr. Elwood C. Zimmerman be authorized to serve as

official representatives of the Society at the IXth International Congress of Entomology to be held at Amsterdam, Holland, August 17-24, 1951.

In response to the President's call for notes and exhibits, Dr. Edwards displayed specimens of *Priacna serrata*, of the family cupesidae which were attracted in great numbers to soap ("Super Suds") used in a wash in Glacier National Park during the summer of 1950. The beetles appeared to be mating, but all were males. Apparently the soap attracts and stimulates the males in a manner similar to that caused by females.

Mr. Potts reported that a pest control operator had brought in Melyridae beetles, *Listrus motschulskii* (LeConte), which were attacking newly developing strawberries in the vicinity of Palo Alto. The species is not native to the United States. Dr. Van Dyke stated that most beetles in this family feed on pollen.

Dr. Kessel exhibited specimens of balloon flies which represent the third species of *Empis* found in Marin County. They were taken at Novata, April 11, 1951, and included several mating pairs.

The president then introduced as the main speaker of the meeting, Mr. R. W. L. Potts, of the California Department of Agriculture, who presented an illustrated lecture on "Collecting on Truk and Ponape." A summary of Mr. Potts' remarks is given below.

A general collecting expedition, lasting four months, was made to the Truk area and Ponape in the Eastern Caroline Islands, under the auspices of the Insect Control Committee of the Pacific Science Board, National Research Council, with financial assistance from the Office of Naval Research. The purpose was to collect as representative a lot of insects as possible in the Truk area to help further the understanding of insect distribution in the oceanic islands of the Pacific.

Truk consists of fifteen volcanic islands and over two hundred coral islets in and around a lagoon some thirty-five miles across. The total land area is just over thirty-seven square miles. The climate is quite moderate, tempered by the nearly continuous light trade winds and frequent rains, which average about five to ten inches precipitation per month, with little or no seasonal variation. The native population is considerable, with just under 10,000 people, approximately one-fifth the total population of the entire Trust Territory of all the Carolines, Marshalls, and Marianas Islands. During the war more than 10,000 Japanese were also stationed on these islands of Truk. As a result, almost the entire land area is or has been in recent cultivation and the native flora is restricted to very small mountain cliff areas. Two further restrictions upon a native insect fauna are placed by an introduced vine *Ipomoea* which has largely taken over the mountain areas, even extending heavily over cliff faces, and by the extremely abundant ant population of a number of pest species.

Collections were made on Moen, Tol, Dublon, Param, Falo, Romanum and Fono Penges among the volcanic islands and at Pis, the largest coral islet. Short exploratory trips with some collecting were made to Nama, an isolated coral islet about sixty-five miles from Truk, and to the large volcanic island of Ponape. About 15,000 insects were collected, but it is expected that the number of endemic species will be rather small.

About 100 color slides were shown, illustrating the various islands visited.

Following a discussion of Mr. Potts' talk the meeting was adjourned.—D. D. Jensen, *Secretary*.

Two Hundred and Nineteenth Meeting
(Semicentennial Program)

The two hundred and nineteenth meeting of the Pacific Coast Entomological Society was held at 2:00 p.m. on September 29, 1951 at the California Academy of Sciences, San Francisco, and commemorated the 50th anniversary of the organization of the Society. President Usinger presided over the meeting. In attendance were 61 members and 22 visitors. The following members were present: E. S. Ross, E. C. Zimmerman, E. O. Essig, J. W. Tilden, Edgar A. Smith, J. P. Harville, A. C. Smith, Alice Eastwood, R. C. Miller, Charles L. Scott, Victor Stombler, William Hazeltine, R. R. Snelling, J. Stage, E. R. Leach, N. A. Lewis, Ruth C. Whitney, Frieda Abernathy, C. P. Hoyt, P. H. Arnaud, N. D. Waters, K. F. Innes, Jr., Paul A. Harvey, T. W. Cook, C. D. MacNeill, W. H. Lange, J. W. MacSwain, E. C. Van Dyke, L. R. Gillogly, R. P. Allen, A. E. Pritchard, W. D. Murray, J. F. Gustafson, H. M. Armitage, J. E. Gillaspy, W. V. Garner, W. C. Bentinck, Harry L. Hansen, Larry W. Quate, R. F. Smith, R. L. Doutt, E. E. Gilbert, K. S. Hagen, H. B. Leech, W. C. Day, S. G. Watkins, C. A. Downing, G. A. Marsh, Benjamin Keh, E. G. Linsley, W. W. Sampson, D. P. Furman, J. H. Freitag, J. R. Helfer, Robert Potts, W. Lutz, R. L. Usinger, J. D. Lattin, C. D. Duncan, J. G. Edwards, and D. D. Jensen. The following visitors were present: Mrs. K. Innes, Jr., Mrs. C. D. MacNeill, R. F. Johnston, Pauline S. Lange, Mrs. L. R. Gillogly, Alan Gillogly, James Gillogly, Keith H. Kellzom, Walter Thomson, Frances Leech, Herbert Meyer, E. Bodwell, Janice Downing, W. P. Horen, S. J. Rutherford, Barbara Prendergast, James Linsley, Joan Linsley, Juanita Linsley, Mrs. E. C. Zimmerman, Geraldine R. Potts, and Michael Potts.

Before the meeting was called to order in the Morrison Auditorium, a picture was taken of the attending members and visitors on the front steps of the Leslie Simson African Hall.

The following were elected to membership in the Society: Harry L. Hansen, William V. Garner, David Cox, Edward E. Gilbert, John D. Lattin, Dr. Donald De Leon, Jerome G. Rozen, L. J. Stage, Harold E. Stark, Walter Thomsen, and William Wall.

President Usinger appointed Mr. Leech, Mr. Green and Dr. Ross to serve as a committee to audit the Society's financial records and report at the annual meeting in December.

Mr. Day, Dr. Furman and Dr. Tilden were appointed as a committee to nominate a slate of proposed officers for the year 1952 at the December meeting.

President Usinger reported that the first volume of the Society's new "Memoirs Series," "The Sucking Lice" by Professor Ferris, was off the press and would be bound and ready for distribution within a short time.

President Usinger reported that Dr. E. C. Van Dyke was the only one of the charter members of the Society who was present at the semi-centennial anniversary program. The only other living charter member is James E. Cottle

of Hayward, California. He also called attention to the presence of Miss Alice Eastwood who joined the Society in 1902, one year after its founding. Dr. Francis X. Williams, who joined the Society in 1904, is still an active member but was not present.

President Usinger then called on Dr. Van Dyke, Honorary President of the Society, to conduct the meeting.

Dr. Van Dyke expressed his pleasure at being present for the occasion and called on Mr. Elwood C. Zimmerman, Entomologist of the Hawaiian Sugar Planters' Association Experiment Station, who presented an address on "The Origin, Development and Decay of Oceanic Islands." Mr. Zimmerman's interesting talk, which was illustrated with an excellent motion picture in color of the spectacular volcanic eruptions in Hawaii, is summarized below.

The development of any biota is fundamentally linked with the geological history of the land. The mode of origin, development and decay of oceanic islands with the accompanying development and decline of their biotas, presents us with many remarkable histories of ecology and organic evolution in a condensed and fascinating manner. The Hawaiian archipelago is composed of typical oceanic islands. It consists of a great line of volcanic peaks extending across the mid-Pacific for a distance as great as that from Canada to Cuba. They have risen as masses of boiling rock from the interior of the earth and have burst sterile through the barren sea. They have never been connected to any other land. They have grown by volcanic outpourings to heights of as much as 14,000 feet above sea level and rising from ocean depths as great as 18,000 feet below sea level. The great processes of erosion have, and are, degrading the mountain masses at a surprisingly rapid rate since the volcanic fires have ceased upbuilding, and the islands are in progressive stages of being worn away and returned to the sea. Some of the old leeward islands have been completely eroded to below sea level and their tops are now capped by coralline materials and are called atolls. (This cycle of birth, development and decay was illustrated with slides and a colored cinema of recent volcanic activity of Mauna Loa, Hawaii.)

The terrestrial plants and animals of these oceanic islands are the descendants of ancestors which were transported across the open sea. The agencies of transport include the ocean currents, winds, and aid from other organisms, including man. The overseas barriers have exerted a selective influence upon the types of plants and animals which have succeeded in crossing the ocean and becoming established. Thus, in Hawaii there are no endemic species of land reptiles, amphibians, mammals, cockroaches, mantids, earwigs, stoneflies, mayflies, caddice flies, scarabs, leafbeetles and many other groups which are present on all of the continents. There is an unusual evolutionary development of some of the groups of organisms which have succeeded in becoming established, however. For example, the greatest concentration of the *Nysius* bug complex occurs in Hawaii. There are more than 100 species of *Odynerus* wasps there, and it is possible that there are more than 200 kinds of *Drosophila* in this area which is less than that of Massachusetts.

At the conclusion of Mr. Zimmerman's talk the meeting was adjourned to the Entomological Laboratories of Leslie Simson African Hall where an

open house was held and refreshments served. On exhibit were many of the Society's books, records, pictures and other material of historical interest.—D. D. Jensen, *Secretary.*

Two Hundred and Twentieth Meeting

The two hundred and twentieth meeting of the Pacific Coast Entomological Society was held at 7:30 p.m. on November 9, 1951 in the Morrison Auditorium of the California Academy of Sciences, San Francisco. President Usinger in the chair. The following members were present: E. S. Ross, W. Harry Lange, A. E. Michelbacher, W. C. Day, D. D. Jensen, E. O. Essig, Theodore Aarons, F. E. Skinner, J. W. Green, Gordon Marsh, C. A. Downing, D. P. Linsdale, S. G. Watkins, N. W. Frazier, Herbert H. Meyer, K. F. Innes, Jr., H. L. Hansen, W. C. Bentinck, W. V. Garner, E. E. Gilbert, E. R. Leach, J. P. Figg-Hoblyn, P. H. Arnaud, Victor Stombler, Norman Lewis, Wm. Hazeltine, J. G. Rozen, C. D. MacNeill, M. Marquis, L. R. Gillogly, H. B. Leech, E. L. Kessel, T. R. Haig, Jr., Lee A. Wood, Jr., J. G. Edwards, K. S. Hagen, and R. L. Usinger. Visitors were present as follows: A. Johnston, P. S. Johnston, H. L. Day, Ruth Ogren, James Balch, R. Morgan, C. E. Bodwell, Peggy Figg-Hoblyn, George Lindsay, Maxine Hagen, Mrs. L. R. Gillogly, and J. Galen.

The minutes of the semicentennial meeting held September 29, 1951, were read and approved.

The following were elected to membership in the Society: Thomas R. Haig, Jr., Charles P. Alexander, Herbert H. Meyer, and Lee A. Wood, Jr.

President Usinger announced that at the Annual Meeting, to be held in December, reports were to be given by all committees as well as an annual report of the Treasurer. The auditing committee and the nominating committee, appointed at the September meeting, were reminded that they were to report at the December meeting.

In response to the President's call for notes and exhibits, Professor Essig circulated a new book by F. S. Bodenheimer, entitled "Insects as Human Food."

Dr. Edwards reported that the drawing selected as the winner in the contest for an official seal had been recovered after being lost in the mails for several weeks.

Mr. Leech reported the death, at the age of 80 years, of J. O. Martin, Secretary during the years 1928-1935.

The President then called on Dr. A. E. Michelbacher, of the University of California, and Dr. E. S. Ross, of the California Academy of Sciences, for reports on their joint collecting expedition in western South America. Both talks were illustrated with excellent kodachrome pictures. Dr. Michelbacher spoke first on "Entomological Impressions of Southwestern South America." A summary of his remarks follows:

Many of the entomological problems in southwestern South America are similar to those in California. In many cases the same species of insects, or closely related ones, are involved. The insect problems in Chile appeared to be more like those found in California than those occurring in Peru. The

absence of killing frosts over much of the agricultural area in Peru results in ecological conditions far different than those encountered in our state. This climatic difference makes it rather difficult to compare the entomological problems of the two areas, in spite of the fact that many species occurring in both regions are the same or closely related.

Chile might well be called the land of the weevils. They were encountered everywhere and as destructive pests they are only outranked by the sucking insects. In Chile many ecological zones similar to those found in California were encountered. The dominant flora in many localities was the same as introduced into California, and often it was necessary to search for native plants and insects for proof that we were in a foreign land.

In Argentina we were impressed by the large swarms of grasshoppers. In one locality the sky as far as the eye could see was full of them flying westward towards the setting sun. Some of the desert region of western Argentina was like certain California deserts, and any comparative insect faunal study between California and South America must include the eastern as well as the western slopes of the Andes.

Our trip through the Alta Plana of Bolivia and Peru will probably be best remembered for cold nights and insect collecting pretty well limited to those that could be found under rocks.

Dr. Ross discussed 'Impressions on the Biogeography of Western South America."

Southward from the Guayaquil gulf of Ecuador the climate and biota of the Pacific slope of the Andes is strongly influenced by the cold Humboldt Current and the blocking of the rain-bearing southeasterly trade winds by the high Andean range. Thus, the entire Pacific Coast of Peru is desert except for irrigated valleys. The desert conditions continue southward as far as north central Chile where a gradual increase in winter rain fall is encountered as one moves southward. This condition increases until many ecological conditions become parallel to those of the Pacific Coast of North America but prevailing in a reverse direction.

In the California-like zone of Central Chile there is a mixture of xerophytic plant life, cacti, *Prosopsis*, etc., which, as in California is derived from the Neotropical region, and a southern temperate flora having more affinities with that of New Zealand and Australia than to that of the remainder of South America. Southward this temperate flora dominates the scene and, together with the highly endemic animal life, constitutes, in spite of its small geographic area, one of the major biotic zones of the world. It is thus a mistake to classify all of South America as Neotropical for the Patogonian area is just as distinct from it as the Nearctic is in North America.

Dr. Ross remarked that Argentina should be of greater interest to North American students because of its ecological conditions paralleling those of northeastern Mexico and the gulf coast of Texas. The desert in the state of Mendoza was found to be highly reminiscent of our own Colorado desert.

The large collection of insects now available at the California Academy of Sciences should, as it is studied by specialists, throw much light on relationships between the faunas of North and South America.

At the conclusion of the talks the meeting was adjourned.—D. D. Jensen, *Secretary.*

Two Hundred and Twenty-first Meeting

The two hundred and twenty-first meeting of the Pacific Coast Entomological Society was held at 7:30 p.m. on December 7, 1951, in the Morrison Auditorium of the California Academy of Sciences, San Francisco. President Usinger conducted the meeting. The following members were present: A. E. Michelbacher, W. W. Middlekauff, H. H. Meyer, E. L. Kessel, E. C. Van Dyke, G. F. Ferris, E. S. Ross, E. E. Skinner, P. H. Arnaud, A. E. Pritchard, Walter Thomsen, L. A. Wood, M. D. Murray, J. G. Rozen, Jr., H. B. Leech, W. C. Day, E. O. Essig, and R. L. Usinger.

Dr. D. G. Denning, Robert Morgan and James Balch were elected to membership in the Society.

Dr. Ross was appointed secretary *pro tem.* Dr. Miller read the Treasurer's report, which was approved by vote of the members present.

Dr. Ross, chairman of the auditing committee, reported that the Society's financial records had been examined and found to be in good order.

Dr. Usinger announced that the Society's new seal was ready and invited discussion regarding its use in the Pan-Pacific Entomologist. Dr. Pritchard moved that the editorial board be empowered to decide on the position of the seal in the Society's publication. The motion carried.

Discussion was opened regarding a new contract for printing the Pan-Pacific Entomologist. Mr. Leech reported that a bid had been received from a San Francisco firm for $10.00 per page. Dr. Kessel suggested changing printers but not the typesetter. No formal action was taken.

The President then called for notes and exhibits. Professor Ferris displayed some of the plates for volume 6 of his scale atlas.

Mr. Hoyt exhibited his drawing of a Chilean neuropteroid (Neuroptera) having dipterous head characters.

Mr. Day, chairman of the nominating committee, proposed and the Society elected the following officers for 1952: E. O. Essig, President; J. W. MacSwain, Vice-President; D. D. Jensen, Secretary; R. C. Miller, Treasurer.

The chairmanship of the meeting was then turned over to President-elect Essig, who called on Dr. Usinger to give his retiring presidential address entitled "The Role of Type Specimens in Taxonomy and Nomenclature."

The position was taken that type specimens can only be specimens upon which descriptions or figures are based. With this as a premise it was concluded (1) that it is the specimen upon which the figure is based that is the type, not just the figure; (2) that a type locality must be the place from which an actual specimen was collected and cannot be restricted to a place inconsistent with existing evidence as to the place of collection; and (3) that neotypes should be recognized officially, but only if designated in connection with a description *in words*, thus conforming to the revised version of Article 25 of the International Rules of Zoological Nomenclature.

Following a lively discussion of Dr. Usinger's address the meeting was adjourned.—E. S. Ross, *Secretary pro tem.*